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Water Rights Locations
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All required maps and cross-sections have been prepared by, or under the supervision of, and certified by a Registered Professional Engineer, State of Utah.

731.710 General Area Hydrology Plate 7-1.

731.720 Plate 7-2.

731.730 Water Monitoring Map Plate 7-4.

731.740 Sediment Pond Map Plates 7-6a and 7-6b.

731.750 Plate 7-6a & b.

731.760 Other Maps (See Section 731.700 for a complete list of maps provided in this section).

731.800 Water Rights and Replacement (See Section 727)

732. Sediment Control Measures

732.100 Siltation Structures The only proposed siltation structure for this site is the sediment pond. All disturbed area runoff is proposed to be directed to this pond for final treatment prior to discharge.

The sediment pond will be constructed and maintained in compliance with applicable regulations. Details of the proposed pond are discussed in the following section and in Appendix 7-4.

732.200 Sedimentation Ponds As discussed above, all disturbed area runoff is proposed to be directed to a sediment pond for final treatment prior to any discharge. The proposed sediment pond will

be located at the low point of the disturbed area, as shown on Plate 7-5.

732.210 Sediment Pond Details The proposed sediment pond is considered <u>temporary</u>, and will be removed during final reclamation. The pond is designed in compliance with the requirements of the following sections, as required:

356.300 - The pond will be maintained until the disturbed area has been stabilized and revegetated. Removal shall not be any sooner than 2 years after the last augmented seeding;

356.400 - Upon removal, the pond area will be reclaimed and reseeded according to the reclamation plan;

513.200 - N/A - The proposed sediment pond does <u>not</u> meet the size or other qualifying criteria of MSHA, 30 CFR 77.216(a);

763 - Refer to this regulation addressed later in this chapter.

Design details for the sediment pond and site drainage control are addressed in Appendix 7-4 of this P.A.P.

732.220 MSHA Requirements This section does not apply since there are no plans for construction of coal processing waste dams or embankments at this site. The proposed pond does <u>not</u> meet the size or other qualifying criteria of MSHA, 30 CFR 77.216(a).

732.300 Diversions There is one undisturbed diversion planned for this site. This diversion consists of a bypass culvert beneath the sediment pond, which will allow undisturbed runoff to bypass the site without mixing with disturbed area runoff.

Other diversions planned consist of disturbed area ditches and culverts, as shown on Plate 7-5. Design details for all diversions are provided in Appendix 7-4.

All diversions will be constructed and maintained to comply with the requirements of R645-301-742.100 and R645-301-742.300.

Details are described under those respective sections of this chapter.

732.400 Road Drainage All roads will be constructed, maintained and reconstructed to comply with R645-301-742.400. Specific information to road drainage is provided under that section of this chapter.

732.410 Alteration or Relocation of Natural Drainages There are no plans to construct roads which will require alteration or relocation of natural drainageways, other than by providing culverted crossings over ephemeral drainages. There are no plans to alter or relocate any intermittent or perennial drainages in conjunction with road construction.

Road construction and design details are provided in Chapter 5 of this P.A.P. Road drainage and culvert design details are provided in Appendix 7-4.

732.420 Culverts Culvert details are provided in Appendix 7-4. All undisturbed culvert inlets will be provided with headwall protection, consisting of inlet sections, rock or concrete.

- **733. Impoundments** The only water impoundment proposed for this site is the sediment pond. Design details for the pond are provided in Appendix 7-4 and on Plates 7-6a &b.
 - 733.100 General Plans The general plan for this site is to drain runoff from the disturbed area into a single sedimentation pond for treatment prior to discharge. Site drainage and design details are described in Appendix 7-4. The general plan includes the following, at a minimum:
 - **733.110 Certification** The sediment control plan and proposed sediment pond designs have been prepared and certified by a Registered Professional Engineer, State of Utah.
 - **733.120 Maps and Cross Sections** Sediment pond locations, design plans and cross sections are provided on Plates 7-5 and 7-6a & b, respectively.

733.130 Narrative A complete description of the proposed sediment pond along with volumes and design/construction details in provided in Appendix 7-4.

733.140 Survey The proposed sediment pond is <u>not</u> located within a potential subsidence area from past underground mining operations.

733.150 Hydrologic and Geologic Information Relevant hydrologic and geologic information for the sediment pond is provided in Appendix 7-4.

733.160 Certification Statement All proposed sediment pond structures are provided with this submittal. The structure will be constructed prior to construction of the mine site area, but not before receiving Division approval.

733.200 Permanent and Temporary Impoundments As indicated earlier, the proposed sediment pond is classed as temporary.

733.210 Design Requirements The proposed sediment pond is temporary; therefore, the pond is not designed to meet requirements of MSHA 30 CFR 77.216.

The proposed pond is not located where failure would expect to cause loss of life or serious property damage. As shown in Appendix 7-4, the proposed pond embankment will have a minimum of 3H: 1V on the inside slope and 2H: 1V on the outside. These slopes, along with the 95% compaction requirement, will ensure a static safety factor in excess of 1.3, as required.

733.220 Permanent Impoundment Section 733.220 is not applicable since the impoundment will be temporary.

733.230 Temporary Impoundment The proposed sediment pond is a temporary impoundment, and will be removed when reclamation sediment control and revegetation criteria are met, in accordance with Phase II Bond Release criteria.

733.240 Inspections/Potential Hazards As indicated under Section 515.200, if any examination or inspection shows a potential hazard exists, the person who examined the impoundment will promptly notify the Division of the finding and emergency procedures formatted for public protection and remedial action.

- 734. Discharge Structure All discharges from sedimentation ponds, diversions and culverts will be protected from erosion by the use of adequately sized rip-rap, concrete or other approved protection. Details for outlet protection for all drainage control structures are provided in appendix 7-4. All discharge structures have been designed according to standard engineering design procedures.
- 735. Disposal of Excess Spoil No excess spoil production is anticipated.
- **736. Coal Mine Waste** Any areas designated for the disposal of coal mine waste will be constructed and maintained to comply with R645-301-746. Details are described under that section.
- **737. Noncoal Mine Waste** Storage and final disposal of noncoal mine waste are described under section 747.
- 738. Temporary Casing and Sealing of Wells There are no wells proposed to be used to monitor ground water conditions associated with this permit or operation. The three Piezometers will be reclaimed according to the requirements of the Divisions's Performance Standards.
- **740. Design Criteria and Plans** Design criteria and plans for this permit are detailed in Appendix 7-4. The following section will describe the general drainage and sediment control plan.
- 741. General Requirements The proposed operation is an underground mine with a relatively small surface disturbance for transportation, support and coal handling facilities. The proposed surface facilities will comprise a disturbed perimeter of approximately 42.6 acres. Access roads and utility lines will consist of approximately 10 acres of additional disturbance along a BLM Right-of-Way designated as a "Transportation Corridor".

The majority of undisturbed runoff from areas above the proposed mine site will be diverted beneath the site via an undisturbed diversion culvert.

Runoff from the disturbed mine site area will be directed to a sediment pond, designed to contain and treat the runoff from a 10 year - 24 hour precipitation event for the contributing watershed. Disturbed area runoff will be directed to the sediment pond via a combination of properly sized ditches and culverts. The general drainage control plan for the mine site is shown on Plate 7-5. The complete Drainage Design and Control Plan is provided in Appendix 7-4 of this P.A.P.

742. Sediment Control Measures See Appendix 7-4 for Sediment Control Measure details.

742.100 General Requirements

742.110 Designed/Constructed/Maintained Appropriate sediment control measures will be designed, constructed and maintained using the best technology currently available to:

742.111 "Prevent, to the extent possible, additional contributions of sediment to stream flow or to runoff outside the permit area;"

This will be accomplished by the construction of undisturbed diversions to allow most undisturbed runoff to by-pass the site and by routing all disturbed runoff to sediment ponds for treatment prior to discharge.

742.112 "Meet the effluent limitations under R645-301-751:"

Any discharge from the sediment ponds will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR Part 434.

742.113 "Minimize erosion to the extent possible:" This will be accomplished by proper routing of drainage, and by the use of energy dissipators and/or erosion protection at all sediment pond, ditch and culvert outlets and in ditches where erosive velocities are expected.

742.120 Sediment Control Measure Sediment control measures within and adjacent to the disturbed areas are detailed in Appendix 7-4. These measures include, but are not limited to:

- **742.121** As discussed in Appendix 7-4, runoff from the disturbed area will be captured in sediment ponds and/or treated as necessary to meet effluent limitations prior to discharge.
- **742.122** As discussed in Appendix 7-4, the majority of undisturbed drainage from above the mine site will be diverted via designed undisturbed diversions.
- **742.123** Undisturbed diversions will consist of properly designed and protected channels and/or culverts as described in Appendix 7-4.
- **742.124** The primary means of velocity reduction is planned to be the use of rip-rap; however, other methods such as straw dikes, check dams and/or vegetative filters may be employed during the operational or reclamation phases as determined necessary, and with Diversion approval.
- **742.125** There are <u>no</u> plans to treat runoff with chemicals. Based on extensive experience with runoff in this area, effluent requirements for discharge can normally be met by containment and settling in a sediment pond.
- **742.126** It is expected that water will be encountered in the underground mining; however, this water will be used for mining needs and only discharged when no further storage is available underground. Any discharge of mine water will meet applicable effluent limitations. Such water will be sampled (and treated if necessary) prior to discharge.
- 742.200 Siltation Structures As described in Appendix 7-4 the sediment ponds will provide for sediment removal for most of the surface facility disturbance. An alternate sediment control method of berms and silt fences will be used at the fan site, around the topsoil stockpile area, and on the slopes below the water treatment area and portal access road. The description of this alternate sediment

control method is also described in Appendix 7-4. In the case of the fan site, this is necessary due to its remote location and rough terrain. In the case of the water treatment slope, due to topography, there is no way to direct the runoff to the sediment basins. Other sediment structures that might be used around the surface facilities are temporary sediment traps such as straw dikes and/or catch basins.

742.210 General Requirements Siltation structures will be designed, constructed and maintained in accordance with the following regulations.

742.211 Siltation structures will be constructed using the best technology currently available to prevent additional contributions of suspended solids and sediment to streamflow outside the permit area to the extent possible. Sediment control structures and details are discussed in Appendix 7-4.

742.212 The siltation structures (i.e. sediment ponds) will be constructed prior to any coal mining and reclamation operations. Upon construction, the ponds and any other siltation structures will be certified by a qualified registered professional engineer to be constructed as designed and approved in the reclamation plan.

742.213 The sediment ponds will be designed, constructed and maintained in accordance with all applicable regulations. See 732.200, 733.200 and Appendix 7-4 for details.

742.214 Any discharge of water from underground workings to surface waters will meet applicable effluent limitations of 751. If such water is found not to meet those requirements, the water will be treated underground prior to discharge, or passed through a siltation structure prior to leaving the permit area.

742.220 Sedimentation Ponds The sedimentation ponds will meet the following criteria:

- 742.221.1 The ponds will be used individually;
- **742.221.2** The ponds are located at the lower end of the disturbed area and out of any perennial stream (See Plate 7-5);
- **742.221.3** The sediment ponds will be designed, constructed and maintained to:
 - **742.221.31** The ponds are designed to contain the runoff from a 10 year 24 hour precipitation event for the area in addition to a minimum of 2 years of sediment storage.
 - **742.221.32** The ponds are designed to provide a minimum of 24 hour retention of the runoff from a 10 year 24 hour precipitation event.
 - **742.221.33** The ponds are designed to contain the runoff from a 10 year 24 hour precipitation event plus a minimum of 2 years of sediment storage.
 - **742.221.34** A nonclogging dewatering devices are proved as described in Appendix 7-4.
 - **742.221.35** This will be accomplished by proper design, construction and maintenance of the ponds as described in Appendix 7-4.
 - **742.221.36** As discussed in Appendix 7-4, sediment will be removed when the level reaches the 2 year storage level. Since the pond is oversized, this leaves adequate room for storage of the design event.
 - **742.221.37** The sediment ponds construction ensures against excessive settlement. See "Sediment Pond Construction Requirements" in Appendix 7-4.
 - **742.221.38** Sediment ponds will be free of sod, large roots, frozen soil, and acid- or toxic-forming coal

processing waste. See "Sediment Pond Construction Requirements" in Appendix 7-4.

742.221.39 The sediment ponds will be compacted properly. See "Sediment Pond Construction Requirements" in Appendix 7-4.

742.222 Sediment Ponds Meeting MSHA Criteria The proposed ponds do not meet the size or other qualifying criteria of MSHA, 30 CFR 77.216(a). Therefore, this section is not applicable.

742.223 Sediment Ponds Not Meeting MSHA Criteria As discussed in Appendix 7-4, the ponds will be equipped with principle spillway and emergency spillway culverts each sized to safely discharge runoff from a 25 year - 6 hour precipitation event.

742.223.1 The Principle Spillway culverts and the Emergency Spillway culverts will be corrugated, metal pipe. Each one designed to carry sustained flows.

742.223.2 N/A - See 742.223.1

742.224 N/A - See 742.223.1

742.225 N/A - No exception requested.

742.225.1 N/A

742.225.2 N/A

742.230 Other Treatment Facilities No other treatment facilities are planned for this operation. Therefore, Section 742.230 is not applicable.

742.240 Exemptions No exemptions are requested at this time; however, since this is a new proposed operation, the need for Small Area Exemptions and/or Alternate Sediment Control Areas may arise in the future.

742.300 Diversions

742.310 General Requirements

742.311 All diversions are considered temporary, and will be removed upon final reclamation.

Diversions are designed to minimize adverse impacts to the hydrologic balance within the permit and adjacent areas, to prevent material damage outside the permit area and to assure the safety of the public detailed diversion designs are presented in Appendix 7-4 of this P.A.P.

742.312 See Appendix 7-4 for diversion designs.

742.313 As indicated, all diversions for the Lila Canyon Mine are temporary, and will be removed when no longer needed. Land disturbed by removal will be reclaimed in accordance with R645-301 and R645-302. Prior to diversion removal, downstream water treatment facilities will be modified or removed. See Reclamation Hydrology Section of Appendix 7-4.

742.320 Diversion of Perennial and Intermittent SteamsSection 742.320 is not applicable since there are no diversions planned for perennial or intermittent streams within the permit area.

742.330 Diversion of Miscellaneous Flows All diversions within the permit area are of miscellaneous flows.

742.331 Certain miscellaneous undisturbed flows are proposed to be diverted around the disturbed area. Other flows are diverted within the disturbed area and to the sediment ponds, as described in Appendix 7-4.

742.332 See Appendix 7-4.

742.333 All temporary diversions are designed to safely pass the peak runoff of a 10-year 6-hour event resulting in a more robust design that the required 2-year 6-hour precipitation event. See Appendix 7-4 for details.

742.400 Road Drainage

742.410 All Roads All roads are designed in accordance with requirements of 534. Drainage control for all roads is discussed in detail in Appendix 7-4. No part of any road is planned to be located in the channel of an intermittent or perennial stream. As shown on Plate 7-2, roads are located to minimize downstream sedimentation and flooding.

742.420 Primary Roads Primary road design is discussed under 534.

742.421 As described in Section 534, all primary roads are to be located, insofar as practical, on the most stable available surfaces.

742.422 There are no stream fords planned for this operation.

742.423 Drainage Control Road drainage control is discussed in Appendix 7-4.

742.423.1 Primary roads will be equipped with adequate drainage control, including ditches, culverts and relief drains. The drainage control system is designed, and will be constructed and maintained, to pass the peak runoff safely from a 10 year - 6 hour precipitation event, as described in Appendix 7-4.

742.423.2 Culvert design and installation details are described in Appendix 7-4. Inlets and outlets are protected from erosion. Undisturbed culvert inlets are to be equipped with trash racks.

742.423.3 Drainage ditch design details are provided in Appendix 7-4.

742.423.4 There are plans to alter the drainage channel on the south boundary of the disturbed area. This drainage is an ephemeral channel with no

riparian habitat. A stream alteration permit will not be required for this channel. A 60 inch culvert and a sedimentation pond will be placed in this channel. Installation of this culvert and sedimentation control plans are described in Appendix 7-4. To ensure that state of the art technology is incorporated, the final reclamation plans for the sedimentation pond area will be submitted prior to commencement of final reclamation of this area.

742.423.5 Stream channel crossings will be provided by culverts designed, constructed and maintained using current, prudent engineering practice, as described in Appendix 7-4.

743. Impoundments

743.100 General Requirements All impoundments associated with this operation are considered temporary.

743.110 Not applicable there are no impoundments planned that meet the criteria of MSHA, 30 CFR 77.216 (a).

743.120 The design of impoundments have been prepared and certified by a qualified, registered professional engineer. As described in Appendix 7-4, the proposed sediment ponds will have at least 2' of freeboard above the highest flow level in the emergency spillway, which is adequate to resist overtopping by waves and by sudden increases in storage volumes.

743.130 As described in Appendix 7-4, the sediment ponds will be equipped with a culvert riser principal spillway and a culvert riser emergency overflow sized to safely pass the runoff from a 25 year - 6 hour precipitation event.

743.131 The principal spillway design is discussed below.

743.131.1 The principle spillway will be constructed of corrugated metal pipe. The emergency spillway will also be constructed of corrugated metal pipe.

744. Discharge Structures

744.100 The sediment pond emergency spillway will be a vertical corrugated metal pipe. It will flow into a 60" diameter C.M.P. beneath the pond and discharge onto an engineered rip-rap apron to prevent scouring or erosion. (See Appendix 7-4).

Diversions and culvert outlets that are expected to have flow velocities in excess of 5 fps will also be equipped with erosion and velocity controls as described in Appendix 7-4.

- **744.200** Discharge structures have been designed and certified according to standard engineering design procedures. (See Appendix 7-4).
- **745. Disposal of Excess Spoil** Section 745 is not applicable since there are no plans for disposal of excess spoil at the Lila Canyon operation.
- 746. Coal Mine Waste The area designated for coal mine waste disposal is within an existing depression area which is located beneath and around the proposed coal storage pile area as shown on Plates 5-2, 7-2 and 7-5. This disposal area will be used for disposal of the rock slope material, reject from coal processing, coal contaminated waste from the mine (i.e. roof falls, etc.) and/or sediment pond waste.

The designated waste area will be within the disturbed area and drained to the sediment pond, and will be constructed according to Division and MSHA requirements. Coal mine waste disposal is discussed in detail under Section 536 of this permit.

746.100 General Requirements

746.110 All coal mine waste will be placed in a new disposal area within the permit area as discussed in Section 536 and 746.

746.120 The area selected for coal mine waste disposal will drain to the sediment pond for final treatment to minimize adverse effects

on the surface and ground water quality and quantity. (See Plates 7-2 and 7-5).

746.200 Refuse Piles. The refuse area is described under Coal Mine Waste in Section 746 and detailed in Section 536. Rock slope material will be used as fill and is referred to as refuse. No coal refuse pile is anticipated. Other than described in Section 536.

746.210 In the event a refuse pile is needed for future operations the refuse piles would be designed to meet the requirements of the above listed Division regulations as well as applicable MSHA regulations. See Section 536 for details.

746.211 The coal mine waste disposal areas will not be located in an area containing springs, seeps or water courses. As shown on Plates 5-2 and 7-5 and described in Appendix 7-4, runoff from the areas will be drained to the sediment pond.

746.212 As described in Sections 536 and 746, the coal refuse will be placed within the mine workings, rock slope material will be placed in existing depression areas. These areas are below grade and will drain to the sediment pond. Due to the location (below grade) no berms or diversion ditches are planned for the Coal Mine Waste Area. See Appendix 7-4 for hydrologic details.

746.213 Not applicable since there are no underdrains planned for this pile.

746.220 Surface Area Stabilization

746.221 The plan for revegetation of the area is discussed in Section 536.

746.222 There are no plans for any permanent impoundments on the refuse or Coal mine waste area. Small depressions may exist for a short time until regrading is completed. These depressions are normally less than one foot in depth and not left for more than 30 days.

- **746.300** This section is not applicable since there are no plans to construct any impounding structures of coal mine waste or to impound coal mine waste.
- **746.400** This section is not applicable since there are no plans to return coal processing waste to abandoned underground workings.
- **747.** Disposal of Noncoal Waste. Disposal of non-coal mine waste is discussed under Section 528.330 of this permit.
 - **747.100** As indicated in Section 528.330, non-coal mine waste will be stored in a controlled manner in a designated area on site. Final disposal of all noncoal mine waste, except concrete during reclamation, will be in a state-approved solid waste disposal area (E.C.D.C.).
 - **747.200** As shown on Plates 5-2B and 7-5, the proposed noncoal mine waste storage area is in a designated site, free of springs or seeps, and drained to the sediment pond.
 - **747.300** There are no plans to dispose of noncoal mine waste within the permit area, except concrete during reclamation. The concrete will be buried beneath a minimum of 2' of non-acid, non-toxic material, and will not degrade surface or ground water.
- 748. Casing and Sealing of Wells There are only three ground water piezometers on the site IPA-1, IPA-2 and IPA-3. They will be reclaimed according to the requirements of the Division's Performance Standards. If any additional wells are required in the future, requirements of this section will be met.

750. Performance Standards

751. Water Quality Discharges of water from this operation will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U. S. Environmental Protection Agency set forth in 40 CFR Part 434. See Sections 731 and 742.

- **752. Sediment Control Measures** Sediment control measures will be located, maintained, constructed and reclaimed according to plans and designs described under Sections 732, 742, 760 and Appendix 7-4.
 - **752.100 Siltation Structures** Siltation structures and diversions will be located, maintained, constructed and reclaimed according to plans and designs described under Sections 732, 742, 763 and Appendix 7-4.
 - **752.200 Road Drainage** Roads will be located, designed, constructed, reconstructed, used, maintained and reclaimed as described under Sections 732.400, 742.400 and 762.
 - **752.210 Control or Prevent Erosion** See Section 742.400 and Appendix 7-4.
 - **752.220 Control or Prevent Additional Disturbance** See Section 742.400 and Appendix 7-4.
 - **752.230 Effluent Standards** See Section 742.400 and Appendix 7-4.
 - **752.240 Degradation of Ground Water Systems** See Section 742.400 and Appendix 7-4.
 - **752.250 Altering Normal Flow of Water** See Section 742.400 and Appendix 7-4.
- **753. Impoundments and Discharge Structures** Impoundments and discharge structures will be located, maintained, constructed and reclaimed as described in Sections 733, 734, 743, 745, 760 and Appendix 7-4.
- **754.** Disposal of Excess Spoil, Coal Mine Waste and Noncoal Mine Waste Disposal areas for excess spoil, coal mine waste and noncoal mine waste will be located, maintained, constructed and reclaimed to comply with Sections 735, 736, 745, 746, 747 and 760.
- **755. Casing and Sealing of Wells** Not applicable since no wells are planned for this site. The three Piezometers will be reclaimed according to the requirements of the Divisions's Performance Standards.

- **760.** Reclamation Reclamation hydrology is detailed in Appendix 7-4.
- **761. General Requirements** Upon completion of operations, the disturbed area will be reclaimed. All drainage and sediment controls are considered temporary and will be removed when no longer required. The sediment pond will remain in place until Phase II Bond Release requirements have been met. At that time, the pond will be removed and the area will be reclaimed in accordance with the approved plan.
- **762. Roads** All roads within the disturbed area are temporary, and will be removed and reclaimed upon completion of operations. An access road will be left in place to reach the sediment pond; however, this road will also be removed and reclaimed when the sediment pond is removed.
 - **762.100** Upon removal of roads, culverts and diversions will also be removed and the natural drainage patterns will be restored.
 - **762.200** Cut and fill slopes will be reshaped according to the approved reclamation plan. This reshaping will be compatible with the postmining land use and will complement the drainage pattern of the surround terrain. Road reclamation is described in Section 550.
- **763. Siltation Structures.** See Appendix 7-4 for details on removal of siltation structures.
 - 763.100 Siltation Structures will be Maintained. As indicated in Section 761, the sediment pond will remain in place until the stability and vegetation requirements for Phase II Bond Release are met. This will be a minimum of 2 years after the last augmented seeding. At this time, the pond will be removed and the area reclaimed.
 - **763.200 Structure is Removed** Upon removal of the sediment pond, the area will be regraded and revegetated in accordance with the approved reclamation plan and Sections 358, 356 and 357.
- **764. Structure Removal** A timetable for reclamation activities is provided in Section 542.100.

765. Permanent Casing and Sealing of Wells There are only three ground water piezometers on the site IPA-1, IPA-2 and IPA-3. They will be reclaimed according to the requirements of the Division's Performance Standards. If any additional wells are required in the future, requirements of this section will be met.

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Appendix 7-4 Lila Canyon Mine Sedimentation and Drainage Control Plan





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SEDIMENTATION AND DRAINAGE CONTROL PLAN

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SEDIMENTATION AND DRAINAGE CONTROL PLAN

1- Introduction

The Sedimentation and Drainage Control Plan for the Lila Canyon Mine has been designed according to the State of Utah R645- Coal Mining Rules, November 1, 1996. All design criteria and construction will be certified by a Utah Registered Professional Engineer.

This plan has been divided into the following three sections:

- 1) Design of Drainage Control Structures for the Proposed Construction
- 2) Design of Sediment Control Structures
- 3) Design of Drainage Control Structures for Reclamation

The general surface water control plan for this project will consist of the following:

- (a) This is a new site construction. All areas proposed for disturbance will be sloped to drain to surface ditches and/or culverts where runoff will be carried to two sediment ponds. All minesite drainage controls and watersheds are shown on Plate 7-5 "Proposed Sediment Control Map".
- (b) The majority of undisturbed runoff will be diverted around the minesite and beneath the sediment pond #1 by properly sized culverts. Undisturbed diversion culvert UC-1, is located on the northwest end of the site. This diversion will allow the majority of undisturbed runoff from the Right Fork of Lila Canyon to bypass the mine area beneath sediment pond #1. All undisturbed diversions are designed to carry runoff from a 100 year 6 hour precipitation event. UC-1 is oversized at 60" diameter.

(c) Two adequately sized sediment ponds will be constructed at the lower end of the site. These ponds are sized to contain and treat the runoff from all of the disturbed area and any contributing undisturbed areas for a 10 year - 24 hour precipitation event. The ponds will be equipped with C.M.P. culvert principle spillway and decant and CMP culvert emergency spillway sized to safely pass runoff from a 25 year - 6 hour precipitation event. The spillways from sediment pond #1 will discharge into the UC-1 CMP culvert running beneath the pond. This culvert will discharge onto an engineered discharge structure and into the Right Fork of Lila Canyon channel below the minesite. The spillways from sediment pond #2 will discharge onto an engineered discharge structure and into the Middle Fork of Lila Canyon channel below the minesite.

DESIGN OF DRAINAGE CONTROL STRUCTURES

Design Parameters:

- 2.1 Precipitation
- 2.2 Flow
- 2.3 Velocity
- 2.4 Drainage Areas
- 2.5 Slope Lengths
- 2.6 Runoff
- 2.7 Runoff Curve Numbers
- 2.8 Culvert Sizing
- 2.9 Culverts
- 2.10 Main Canyon Culvert Outlet Structure
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Tables:

Table 1	Undisturbed Watershed Summary
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Table 3	Watershed Parameters
Table 4	Runoff Summary - Undisturbed Watershed (Not Draining to Pond)
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rigure i	Culvert Nomograph
Figure 2	Rip-Rap Chart
Figure 3	Disturbed Ditch Typical Section
Figure 4	Trash Rack - Culvert Inlet - Typical Section
Figure 4A	UC-1 Culvert Outlet

Design Parameters

2.1 Precipitation

The precipitation-frequency values for the area were taken from the approved Mining and Reclamation Plan, Horse Canyon Mine, Emery County, Utah, Volume III, submitted by I.P.A.

Frequency - Duration	Precipitation	
10 year - 6 hour	1.30"	
10 year - 24 hour	1.90"	
25 year - 6 hour	1.50"	
100 year - 6 hour	1.90"	

2.2 Flow

Peak flows, flow depths, areas and velocities were calculated using the computer program "Office of Surface Mining Watershed Model", <u>Storm Version 6.21</u> by Gary E. McIntosh. All flows are based on the SCS - TR55 Method for both SCS 6-hour and NOAA Type II, 24-hour storms.

Time of concentration of storm events was calculated for each drainage area using the SCS upland curve method included as part of the Storm software. For the undisturbed areas UA-1 and UA-4 the watershed type was set at forested and the curve condition was set at bare ground. For UA-6a and UA-6b and all DA watersheds, the watershed type was set as disturbed and the curve condition was set at bare ground.

2.3 Velocity

Flow velocities for each ditch structure were calculated using the Storm computer program with Manning's Formula:

$$V = 1.49 R^{2/3} S^{1/3}$$

where:

V = Velocity (fps)
R = Hydraulic Radius (ft.)
S = Slope (ft. per ft.)

S = Slope (ft. per ft.) n = Manning's n; Table 3.1, p. 159,

"Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner & Haan,

1983.

Note: The following Manning's n were used in the calculations:

Structure	Manning's n	
Culverts (cmp)	0.025	
Unlined Disturbed Area Ditches	0.035	

2.4 Drainage Areas

All drainage areas were planimetered directly from either Plate 7-1, "Permit Area Hydrology Map", and Plate 7-2, "Disturbed Area Hydrology/Watershed".

2.5 Slopes, Lengths

All slopes and lengths were measured directly from the topography on Plates 7-1 and 7-2.

2.6 Runoff Volume

Runoff was calculated using the SCS Formula for NOAA Type II, 24-hour storms; using the Storm Version 6.21 computer program:

$$Q = \frac{(P - 0.2 \text{ S})^2}{P + 0.8 \text{ S}}$$

where:

CN = Runoff Curve Number

Q = Runoff in inches

P = Precipitation in inches

 $S = \frac{1000}{CN} - 10$

2.7 Runoff Curve Numbers

Two curve numbers were utilized for the undisturbed areas. Areas with milder slopes (less than 30%) were given a runoff curve number of 75. All other undisturbed areas (30% slope or greater) were given a runoff curve number of 83. These numbers were taken directly from the approved "Mining and Reclamation Plan, Horse Canyon Mine, Emery County, Utah, Volume III", submitted by I.P.A. The numbers in that plan were based on vegetation and soils data from on-site.

Two other runoff curve numbers have been used in the calculations. A runoff CN of 90 is used for all disturbed areas (including the areas designated as undisturbed which lie within the disturbed area boundary (See Plate 7-2), and a runoff CN of 95 is used for paved areas. These numbers are based on commonly used and approved values and from Table 2.20, (p. 82, Barfield, et al, 1983).

The following is a summary of runoff curve numbers used in these calculations:

Watershed	Runoff CN	
Undisturbed (<30% slopes):	75	
Undisturbed (>30% slopes):	83	
Disturbed:	90	
Paved:	95	

2.8 Culvert Sizing

Minimum culvert sizing is based on the either the inlet control nomograph or Manning's Equation. Culverts were evaluated for inlet control conditions to determine the minimum pipe size using the Culvert Nomograph included as Figure 1 of this Appendix. If the pipe had a HW/D ratio equal to or greater than 1.0 or the slope were less than 2% the Haestad Methods, Flowmaster, Version 6.0 computer program was used to determine the pipe flow diameter using:

$$D = (\frac{2.16 \ Q \ n}{\sqrt{s}})^{0.35}$$

where:

D = Required Diameter (feet)

Q = QP = Peak Discharge (cfs)

n = Roughness Factor (0.025 for CMP)

S = Slope (ft. per ft.)

2.9 Culverts

Culverts have been sized according to the calculations previously described, and are shown on Plate 7-5, "Proposed Sediment Control Map". Culverts carrying undisturbed drainages are designated with UC- Letters (i.e. UC-1). All undisturbed area drainage culverts will be fitted with trash racks to minimize plugging by rocks or other debris.

Trash racks will be provided at the inlet for all undisturbed drainage culverts. These will consist of 3/4" steel bars welded on 6" centers across the flared inlet structures of each culvert. Bars will be sloped from the front of the inlet structure up to the top of the culvert. This ramp configuration will allow trash, branches and other potential obstructions to be swept up and away from the inlet rather than being impinged against the grates during a flow event. Rip rap will be placed around the flared inlet structure and above it to a height of at least 6" above the required headwall for each culvert. (See Figure 4 for details). Trash racks will be checked on a routine schedule and following precipitation events and all trash, branches and other obstructions will be removed.

It should be noted that all undisturbed area culverts are adequately sized to handle the expected runoff from a 100 year - 6 hour event for maximum protection of the mine area, sediment pond and undisturbed drainage. This is well in excess of the 10 year - 6 hour event required by the regulations and is proposed as an extra measure of safety.

Disturbed area culverts and ditches are shown on the "Sediment Control Map", Plate 7-5. Culverts carrying disturbed drainage are designated with a DC-number (i.e. DC-1). Calculations for all disturbed area culverts and ditches are also included with this report, along with design criteria. Disturbed drainage areas draining to culverts and ditches are marked with a DA-number (i.e. DA-1). Undisturbed drainage areas are marked with a UA-number (i.e. UA-1).

Culverts will be inspected regularly, and cleaned as necessary to provide for passage of drainage flows. Inlets and outlets shall also be maintained so as to prevent plugging or undue restriction of water flow.

All disturbed area culverts are temporary, and will be removed upon final reclamation.

2.10 Main Canyon Culvert - Outlet Structure

The outlet of culvert UC-1 has been designed to flow onto a rip-rap apron to protect against souring and to allow for energy dissipation. The rip-rap apron is designed to fit the natural channel configuration as closely as possible, and will allow runoff to re-enter the natural channel at a reduced velocity which is no greater than natural flow conditions. Runoff from the 100 year - 6 hour precipitation event in the canyon below the minesite has been calculated at 52.32 cfs, including sediment pond overflow.

The rip-rap apron design is based on Figure 7-26, Design of Outlet Protection -Maximum Tailwater Condition, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983. Based on the figure, the apron should be a minimum of 15' in length, widening from 5' to 9', with a 0.1% slope. The proposed length has been increased to 20', to ensure adequate time for velocity reduction. The apron slope is kept at 0.1%. Rip-rap size is conservatively placed at 12" D_{50} . Rip-rap will be placed to a depth of 1.5 D_{50} and will be placed on a 6" layer of 2" drain rock filter. Rip-rap will also be placed on the 2H:1V side slopes to the height of the culvert (4') at the culvert outlet tapering to 3' at the outlet of the apron. This rip-rap apron has been sized and designed to adequately dissipate energy from flow velocities of a 100 year - 6 hour precipitation event and resist dislodgement. The drain rock filter bed will also serve to secure the rip-rap boulders firmly in place, to add an additional element of stability, and prevent scouring underneath the armored apron. (See Figure 4A for construction details). The natural channel below the culvert has a gradient of approximately 7.76%. When the flow is routed from the culvert across the apron to the natural channel, the velocity is reduced from 4.79 fps at the culvert outlet to 1.50 fps at the outlet of the apron. (See Culvert Outlet Rip-Rap Apron Flow Velocity Calculations in Appendix 1.)

It should be noted that these calculations are based on a 100 year - 6 hour event.

2.11 Ditches

All ditches will carry disturbed area drainage to the pond. Ditches are shown on the Proposed Sediment Control Map, Plate 7-5, and are designated with a DD-number (i.e. DD-1 for Disturbed Area Ditches) or UD-number (i.e. UD-1 for Undisturbed Area Ditches).

All ditches are designed to carry the expected runoff from a 10 year - 6 hour event with a minimum freeboard of 0.5' (See Table 8 and Figure 3).

Ditches which exhibit expected flow velocities of 5 fps or greater will be lined with riprap. A typical cross-section is shown on Figure 3 and flow depths and areas for all lined and unlined ditches are presented in Table 8 of this report.

Ditch slopes have been determined from Plates 7-2 and 7-5.

All ditches will be inspected regularly, and maintained to the minimum dimensions to provide adequate capacity for the design flow. All ditches are temporary and will be removed as described under the reclamation hydrology section. (Section 4)

TABLE 1

Table 1 Undisturbed Watershed Summary					
Watershed Drains To Final					
UA-1	UC-1	Lila Canyon			
UA-2	DD-2	Sediment Pond			
UA-4	Sediment Pond	Sediment Pond			
UA-6a	DD-12	Sediment Pond			
UA-6b	DD-11	Sediment Pond			
UA-7	ASCA Area	Lila Canyon			
UA-8	ASCA Area	Lila Canyon			

TABLE 2

Table 2 Disturbed Watershed Summary					
Watershed	Drains To	Final			
DA-1a	DD-1a	Sediment Pond			
DA-1b	DD-1b	Sediment Pond			
DA-1c	DD-1c	Sediment Pond			
DA-2a	DD-2a	Sediment Pond			
DA-2b	DD-2b	Sediment Pond			
DA-2c	DD-2c	Sediment Pond			
DA-3	DD-3	Sediment Pond			
DA-4a	DD-4a	Sediment Pond			
DA-4b	DD-4b	Sediment Pond			
DA-4c	DD-4c	Sediment Pond			
DA-5a	DD-5a	Sediment Pond			
DA-5b	DD-5b	Sediment Pond			
DA-5c	DD-5c	Sediment Pond			
DA-6a	DD-6a	Sediment Pond			
DA-6b	DD-6b	Sediment Pond			
DA-6c	DD-6c	Sediment Pond			
DA-7	DD-7	Sediment Pond			
DA-8a	DD-8a	Sediment Pond			
DA-8b	DD-8b	Sediment Pond			
DA-8c	DD-8c	Sediment Pond			
DA-9	DD-9	Sediment Pond			
DA-10	DD-10	Sediment Pond			
DA-11	DD-11	Sediment Pond			
DA-13a	DD-13a	Sediment Pond			
DA-13b	DD-13d	Sediment Pond			
DA-13c	DD-13e	Sediment Pond			
DA-14a	DD-14a	Sediment Pond 2			
DA-14b	DD-14b	Sediment Pond 2			
DA-15a	DD-15a	Sediment Pond 2			
DA-15b	DD-15b	Sediment Pond 2			
DA-16a	DD-16a	Sediment Pond 2			
DA-16b	DD-16b	Sediment Pond 2			
DA-17a	DD-17a	Sediment Pond 2			
DA-17b	DD-17b	Sediment Pond 2			
DA-18a	DD-18a	Sediment Pond 2			
DA-18b	DD-18b	Sediment Pond 2			
TS-1	Topsoil Berm	Sediment Pond			
POND	Sediment Pond	Sediment Pond			

TABLE 3

		TAB	LE 3		
		Tab: Watershed			
Watershed	Area (Acre)	Hydraulic Length (ft.)	Elevation Change (ft.)	% Slope	CN
		Undisturbed	Watersheds		
UA-1	248.41	5200	1480	28.46	75
UA-2	10.01	1500	1000	66.67	83
UA-4	14.08		595	47.76	83
	1.45	230	80	34.70	90
UA-6b	0.40	90	30	33.33	90
UA-7	0.60	195	25	12.80	90
UA-8	0.37	100	30	30.00	90
		Disturbed V	Vatersheds		
DA-1a	0.33	680	152	22.35	95
DA-1b	0.31	420	48	11.43	95
DA-1c	0.20	225	20	8.89	95
DA-2a	0.93	680	162	23.82	95
DA-2b	0.14	350	36	10.29	95
DA-2c	0.10	106	16	15.10	95
DA-3	0.30	170	16	9.41	90
DA-4a	0.14	100	12	12.00	95
DA-4b	0.12	270	28	10.37	95
DA-4c	0.60	580	54	9.31	95
DA-5a	0.07	180	24	13.33	95
DA-5b	0.33	125	14	11.20	90
DA-5c	0.42	570	54	9.47	95
DA-6a	0.28		54	27.	90
DA-6b	3.35	760	70	9.21	90
DA-6c	2.51	690	70	10.14	90
DA-7	2.68	630	30	4.76	95
DA-8a	0.26	284	54	19.01	90
DA-8b	0.76	670	52	7.80	90
DA-8c	0.95	410	42	10.24	90
DA-9	0.05	50	6	12.00	95_
DA-10	2.89	700	20	2.86	95
DA-11	0.78	340	16	4.70	95
DA-13a	1.97	470_	12	2.55	95
DA-13b	0.49	280	4	1.43	90
DA-13c	0.40	460	22	4.78	90
DA-14a	0.36	390	34	8.71	95

TABLE 3 (Continued)

Table 3 Watershed Parameters						
Watershed	Area (Acre)	Hydraulic Length (ft.)	Elevation Change (ft.)	% Slope	CN	
		Disturbed V	Watersheds			
DA-14b	0.75	540	16	2.96	95	
DA-15a	0.38	525	50	9.52	95	
DA-15b	0.62	270	12	4.44	95	
DA-16a	0.16	370	10	2.70	95	
DA-16b	0.09	210	13	6.19	95	
DA-17a	0.42	610	19	3.11	95	
DA-17b	0.07	100	5	5.00	95	
DA-18a	0.07	175	6	3.43	95	
DA-18b	0.44	650	24	3.69	95	
TS-1	2.95	660	38	5.75	83	
POND	1.92	380	50	13.16	95	

TABLE 4

Table 4 Runoff Summary Undisturbed Watersheds (Not Draining to Ponds)

Watershed	10 yr. / 6 hr. Peak Flow - cfs	25 yr. / 6 hr. Peak Flow - cfs	100 yr. / 6 hr. Peak Flow - cfs	10 yr. / 24 hr. Peak Flow - cfs	10 yr. / 24 hr. Volume - ac.ft.
UA-1	7.02	10.31	20.48	25.53	6.90
UA-7	0.21	0.27	0.40	0.43	0.03
UA-8	0.14	0.18	0.26	0.14	0.03

TABLE 5

Table 5 Runoff Summary Watershed Drainage to Sediment Pond						
Watershed	10 yr. / 6 hr. Peak Flow-cfs	25 yr. / 6 hr. Peak Flow-cfs	10 yr. / 24 hr. Peak Flow-cfs	10 yr. / 24 hr. Volume-ac-ft		
	Undisturbe	d Watersheds draining	to Pond #1			
UA-2	2.11	3.11	6.11	0.52		
UA-4	3.14	4.65	9.20	0.74		
UA-6a	0.47	0.60	0.95	0.12		
UA-6b	0.10	0.13	0.21	0.03		
	Disturbed	Watersheds draining to	Pond #1			
DA-1a	0.22	0.26	0.37	0.04		
DA-1b	0.20	0.24	0.33	0.04		
DA-1c	0.11	0.14	0.19	0.02		
DA-2a	0.61	0.73	1.03	0.11		
DA-2b	0.09	0.10	0.15	0.02		
DA-2c	0.04	0.05	0.08	0.01		
DA-3	0.11	0.14	0.21	0.03		
DA-4a	0.06	0.08	0.11	0.02		
DA-4b	0.07	0.08	0.12	0.01		
DA-4c	0.42	0.51	0.71	0.07		
DA-5a	0.05	0.06	0.09	0.01		
DA-5b	0.11	0.14	0.21	0.03		
DA-5c	0.29	0.35	0.49	0.05		
DA-6a	0.09	0.12	0.18	0.02		
DA-6b	1.60	2.06	3.27	0.28		
DA-6c	1.18	1.52	2.40	0.21		
DA-7	1.98	2.39	3.36	0.31		
DA-8a	0.10	0.12	0.19	0.02		
DA-8b	0.36	0.47	0.74	0.06		
DA-8c	0.40	0.52	0.81	0.08		
DA-9	0.04	0.05	0.07	0.01		
DA-10	2.19	2.65	3.73	0.33		
DA-11	0.52	0.63	0.89	0.09		
DA-13a	1.46	1.76	2.47	0.23		
DA-13b	0.23	0.30	0.47	0.04		
DA-13c	0.19	0.24	0.38	0.03		
TS-1	0.65	0.96	1.90	0.15		
POND	1.18	1.42	1.99	0.22		
TOTAL		26.58		3.95		

TABLE 5 (Continued)

Table 5 Runoff Summary Watershed Drainage to Sediment Pond						
Watershed	10 yr. / 6 hr. Peak Flow-cfs	25 yr. / 6 hr. Peak Flow-cfs	10 yr. / 24 hr. Peak Flow-cfs	10 yr. / 24 hr. Volume-ac-ft		
	Disturbed	Watersheds draining to	Pond #2			
DA-14a	0.23	0.28	0.39	0.04		
DA-14b	0.56	0.67	0.95	0.09		
DA-15a	0.26	0.31	0.44	0.04		
DA-15b	0.40	0.48	0.67	0.07		
DA-16a	0.11	0.14	0.19	0.02		
DA-16b	0.06	0.07	0.10	0.01		
DA-17a	0.31	0.38	0.53	0.05		
DA-17b	0.05	0.06	0.09	0.01		
DA-18a	0.06	0.07	0.10	0.01		
DA-18b	0.33	0.40	0.56	0.05		
TOTAL		2.86		0.		

TABLE 6

	Table 6 Runoff Control Structure Watershed Summary				
Structure	Туре	Contributing Watersheds/Structures			
UC-1	Culvert	UA-1, UA-7, Sediment Pond Overflow			
DD-1a	Ditch	DA-1a			
DD-1b	Ditch	DD-1a, DA-1b, UA-6b			
DC-2	Culvert	DD-1b			
DD-1c	Ditch	DC-2, DA-1c			
DD-2a	Ditch	DA-2a, UA-2			
DD-2b	Ditch	DD-2a, DA-2b			
DC-1	Culvert	DD-2b, UA-2			
DD-2c	Ditch	DC-1, DA-2c			
DC-3	Culvert	DD-2c			
DD-3	Ditch	DA-3			
DC-4	Culvert	DD-3			
DD-4a	Ditch	DA-4a			
DD-4b	Ditch	DD-4a, DC-4, DA-4b			
DC-20	Culvert	DD-4b			
DD-4c	Ditch	Dc-20, DA-4c			
DC-9	Culvert	DD-4c			
DD-5a	Ditch	DA-5a			
DD-5b	Ditch	DD-5a, DA-5b			
DC-5	Culvert	DD-5b			
DD-5c	Ditch	DC-5, DA-5c			
DC-10	Culvert	DD-5c, DC-9			
DD-6a	Ditch	DC-3, DD-1c, DA-6a			

	Table 6 Runoff Control Structure Watershed Summary				
Structure	Туре	Contributing Watersheds/Structures			
DC-6	Culvert	DD-6a			
DD-6b	Ditch	DC-6, DA-6b			
DD-6c	Ditch	DA-6c			
DC-8	Culvert	DD-6b, DD-6c			
DD-7	Ditch	DA-7			
DC-7	Culvert	DD-7			
DD-8a	Ditch	DA-8a			
DD-8b	Ditch	DD-8a, DC-7, DA-8b			
DD-8c	Ditch	DD-8b, DC-8, DA-8c			
DD-9	Ditch	DC-10, DD-5c, DA-9			
DC-11	Culvert	DD-9			
DD-10	Ditch	DA-10			
DC-12	Culvert	DD-10			
DD-11	Ditch	DA-11			
DD-12	Ditch	DD-7, UA-6a			
DD-13a	Ditch	DC-11, DA-13a			
DD-13b	Ditch	DD-13a, DD-11			
DD-13c	Ditch	DD-13b, DC-12			
DD-13d	Ditch	DD-13c, DD-8c, DD-13b			
DC-13	Culvert	DD-13d			
DD-13e	Ditch	DC-13, DA-13c			
DD-14a	Ditch	DA-14a			
DD-14b	Ditch	DA-14b			
DC-14	Culvert	DD-14a, DD-14b			
DD-15a	Ditch	DA-15a			

Table 6 Runoff Control Structure Watershed Summary				
Structure	Type Contributing Watersheds/Structures			
DD-15b	Ditch	DD-15a, DA-15b		
DC-19	Culvert	DD-15b		
DD-16a	Ditch	DA-16a		
DC-15	Culvert	DD-16a		
DD-16b	Ditch	DC-15, DA-16b		
DD-17a	Ditch	DA-17a		
DC-16	Culvert	DD-17a		
DD-17b	Ditch	DC-16, DC-14, DA-17b		
DC-17	Culvert	DD-17b, DD-16b		
DD-18a	Ditch	DA-18a		
DC-18	Culvert	DD-18a		
DD-18b	Ditch	DC-18, DA-18b		

DD-12 does not exist.

TABLE 7

Table 7 Runoff Control Structure Flow Summary						
Structure	Туре	10yr. / 6hr. Peak Flow-cfs	10yr. / 24hr. Peak Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs	
UC-1	Culvert	38.67	57.40	42.02	52.32	
DD-1a	Ditch	0.22	0.37	0.26		
DD-1b	Ditch	0.52	0.91	0.63		
DC-2	Culvert	0.52	0.91	0.63		
DD-1c	Ditch	0.63	1.10	0.77		
DD-2a	Ditch	2.72	7.14	3.84		
DD-2b	Ditch	2.81	7.29	3.94		
DC-1	Culvert	2.81	7.29	3.94		
DD-2c	Ditch	2.85	7.37	3.99		
DC-3	Culvert	2.85	7.37	3.99		
DD-3	Ditch	0.11	0.21	0.14		
DC-4	Culvert	0.11	0.21	0.14		
DD-4a	Ditch	0.06	0.11	0.08		
DD-4b	Ditch	0.24	0.44	0.30		
DC-20	Culvert	0.24	0.44	0.30		
DD-4c	Ditch	0.66	1.15	0.81		
DC-9	Culvert	0.66	1.15	0.81		
DD-5a	Ditch	0.05	0.09	0.06		
DD-5b	Ditch	0.16	0.30	0.20		
DC-5	Culvert	0.16	0.30	0.20		
DD-5c	Ditch	0.45	0.79	0.55		
DC-10	Culvert	1.11	1.94	1.36		
DD-6a	Ditch	2.94	7.55	4.11		

Table 7 Runoff Control Structure Flow Summary						
Structure	Туре	10yr. / 6hr. Peak Flow-cfs	10yr. / 24hr. Peak Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs	
DC-6	Culvert	2.94	7.55	4.11		
DD-6b	Ditch	4.54	10.82	6.17		
DD-6c	Ditch	1.18	2.40	1.52		
DC-8	Culvert	5.72	13.22	7.69		
DD-7	Ditch	2.45	4.31	2.99		
DC-7	Culvert	2.45	4.31	2.99		
DD-8a	Ditch	0.10	0.19	0.12		
DD-8b	Ditch	2.91	5.24	3.58		
DD-8c	Ditch	6.12	14.03	8.21		
DD-9	Ditch	0.04	2.80	1.96		
DC-11	Culvert	1.60	2.80	1.96		
DD-10	Ditch	2.19	3.73	2.65		
DC-12	Culvert	2.19	3.73	2.65		
DD-11	Ditch	0.52	0.89	0.63		
DD-13a	Ditch	3.06	5.27	3.72		
DD-13b	Ditch	3.58	6.16	4.35		
DD-13c	Ditch	5.77	9.89	7.00		
DD-13d	Ditch	6.35	14.50	8.51		
DC-13	Culvert	6.35	14.50	8.51		
DD-13e	Ditch	6.54	14.88	8.75		
DD-14a	Ditch	0.23	0.39	0.28		
DD-14b	Ditch	0.56	0.95	0.67		
DC-14	Culvert	0.79	1.34	0.95		
DD-15a	Ditch	0.26	0.44	0.31		

Table 7 Runoff Control Structure Flow Summary							
Structure	Туре	10yr. / 6hr. Peak Flow-cfs	10yr. / 24hr. Peak Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs		
DD-15b	Ditch	0.66	1.11	0.79			
DC-19	Culvert	0.66	1.11	0.79			
DD-16a	Ditch	0.11	0.19	0.14			
DC-15	Culvert	0.11	0.19	0.14			
DD-16b	Ditch	0.17	0.29	0.21			
DD-17a	Ditch	0.31	0.53	0.38			
DC-16	Culvert	0.31	0.53	0.38			
DD-17b	Ditch	1.15	1.96	1.39			
DC-17	Culvert	1.32	2.25	1.60			
DD-18a	Ditch	0.06	0.10	0.07			
DC-18	Culvert	0.06	0.10	0.07			
DD-18b	Ditch	0.39	0.66	0.47			

DD-12 does not exist.

UC-1 flow values include 25 yr-6hr sediment pond peak flow 31.44 cfs.

TABLE 8

	Table 8 Disturbed Ditch Design Summary							
Ditch	DD-1a	DD-1b	DD-1c	DD-2a	DD-2b	DD-2c		
Slope (%)	11.42	11.20	10.00	12.06	10.29	14.29		
Length (ft.)	683	420	20	680	350	105		
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035		
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1		
*Bottom Width (ft.)	0.00	0.00	0.00	2.00	2.00	2.00		
Peak Flow 10/6 (cfs)	0.22	0.52	0.63	2.72	2.81	2.85		
Peak Flow 10/24 (cfs)	0.37	0.91	1.10	7.14	7.29	7.37		
Flow Depth (ft.) 10/6	0.20	0.27	0.30	0.23	0.24	0.22		
Flow Depth (ft.) 10/24	0.24	0.34	0.37	0.39	0.42	0.38		
Flow Area (ft.2) 10/6	0.08	0.15	0.18	0.56	0.61	0.55		
Flow Area (ft.2) 10/24	0.11	0.23	0.27	1.10	1.18	1.06		
Velocity (fps) 10/6	2.84	3.49	3.51	4.81	4.61	5.18		
Velocity (fps) 10/24	3.23	4.02	4.04	6.49	6.18	6.96		
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N		
Rip-Rap D ₅₀	-	-	-	-	-	-		
Note: Slope/Lengths from P	late 7-2.							

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-3	DD-4a	DD-4b	DD-4c	DD-5a	DD-5b	DD-5c
Slope (%)	0.60	11.00	10.26	10.00	13.11	11.11	9.52
Length (ft.)	171	100	273	580	183	126	567
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peak Flow 10/6 (cfs)	0.11	0.06	0.24	0.66	0.05	0.16	0.45
Peak Flow 10/24 (cfs)	0.21	0.11	0.44	1.15	0.09	0.30	0.79
Flow Depth (ft.) 10/6	0.26	0.12	0.21	0.30	0.11	0.18	0.27
Flow Depth (ft.) 10/24	0.34	0.15	0.26	0.38	0.14	0.22	0.33
Flow Area (ft.2) 10/6	0.14	0.03	0.09	0.19	0.02	0.06	0.14
Flow Area (ft.2) 10/24	0.23	0.05	0.14	0.28	0.04	0.10	0.22
Velocity (fps) 10/6	0.79	2.02	2.79	3.55	2.06	2.59	3.17
Velocity (fps) 10/24	0.93	2.35	3.24	4.08	2.39	3.04	3.65
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N	N
Rip-Rap D ₅₀	_	-	-	-	-	-	-
Note: Slope/Lengths from P	late 7-2.						

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-6a	DD-6b	DD-6c	DD-7	DD-8a	DD-8b	DD-8c
Slope (%)	18.00	2.56	3.38	1.08	20.42	7.81	10.34
Length (ft.)	200	507	532	370	284	666	406
Manning's No.	0.040	0.035	0.035	0.035	0.035	0.035	0.040
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	3.00	1.00	1.00	1.00	0.00	1.00	2.00
Peak Flow 10/6 (cfs)	2.94	4.54	1.18	2.45	0.10	2.91	6.12
Peak Flow 10/24 (cfs)	7.55	10.82	2.40	4.31	0.19	5.24	14.03
Flow Depth (ft.) 10/6	0.19	0.60	0.28	0.55	0.13	0.37	0.41
Flow Depth (ft.) 10/24	0.32	0.90	0.41	0.72	0.17	0.49	0.63
Flow Area (ft.2) 10/6	0.62	1.32	0.45	1.15	0.03	0.63	1.14
Flow Area (ft. ²) 10/24	1.17	2.52	0.75	1.75	0.06	0.98	2.07
Velocity (fps) 10/6	4.71	3.43	2.64	2.12	2.90	4.59	5.35
Velocity (fps) 10/24	6.47	4.29	3.21	2.46	3.40	5.37	6.78
Rip-Rap Req'd (Y/N)	Y	N	N	N	N	N	Y
Rip-Rap D ₅₀	6"	-	-		-	-	6"
Note: Slope/Lengths from P	late 7-2.		•				

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-9	DD-10	DD-11	DD-13a	DD-13b	DD-13c	DD-13d
Slope (%)	10.00	3.02	5.06	2.53	3.23	3.30	1.25
Length (ft.)	50	696	336	474	62	38	278
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	0.00	1.00	0.00	1.00	1.00	1.00	3.00
Peak Flow 10/6 (cfs)	0.04	2.19	0.52	3.06	3.58	5.77	6.35
Peak Flow 10/24 (cfs)	0.07	3.73	0.89	5.27	6.16	9.89	14.50
Flow Depth (ft.) 10/6	0.11	0.40	0.32	0.50	0.51	0.63	0.57
Flow Depth (ft.) 10/24	0.13	0.53	0.39	0.65	0.66	0.82	0.89
Flow Area (ft. ²) 10/6	0.02	0.73	0.20	0.99	1.02	1.44	2.36
Flow Area (ft. ²) 10/24	0.03	1.08	0.30	1.48	1.52	2.15	4.25
Velocity (fps) 10/6	1.76	3.00	2.59	3.08	3.51	4.01	2.69
Velocity (fps) 10/24	2.03	3.46	2.97	3.55	4.05	4.61	3.41
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N	N
Rip-Rap D ₅₀	-	-	-	-	-	-	-
Note: Slope/Lengths from Pla	te 7-2.			-			

TABLE 8 (Continued)

	Table 8 (Continued) Disturbed Ditch Design Summary								
Ditch	DD-13e	DD-14a	DD-14b	DD-15a	DD-15b	DD-16a	DD-16b		
Slope (%)	4.78	8.72	3.15	9.70	4.07	2.97	6.06		
Length (ft.)	460	390	540	525	270	370	165		
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035		
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1		
*Bottom Width (ft.)	3.00	0.00	0.00	0.00	0.00	0.00	0.00		
Peak Flow 10/6 (cfs)	6.54	0.23	0.56	0.26	0.66	0.11	0.17		
Peak Flow 10/24 (cfs)	14.88	0.39	0.95	0.44	1.11	0.19	0.29		
Flow Depth (ft.) 10/6	0.40	0.21	0.36	0.22	0.36	0.20	0.20		
Flow Depth (ft.) 10/24	0.63	0.26	0.43	0.26	0.44	0.24	0.25		
Flow Area (ft.2) 10/6	1.52	0.09	0.25	0.09	0.26	0.08	0.08		
Flow Area (ft.2) 10/24	2.68	0.13	0.38	0.14	0.38	0.12	0.12		
Velocity (fps) 10/6	4.31	2.59	2.21	2.78	2.54	1.44	2.10		
Velocity (fps) 10/24	5.54	2.96	2.52	3.18	2.89	1.65	2.40		
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N	N		
Rip-Rap D ₅₀	-	-		-	_	-	-		
Note: Slope/Lengths from F	Plate 7-2.	•	· · · · · · · · · · · · · · · · · · ·				•		

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-17a	DD-17b	DD-18a	DD-18b			
Slope (%)	2.68	4.12	2.86	3.54			
Length (ft.)	485	97	175	650			
Manning's No.	0.035	0.035	0.035	0.035	-		
Side Slope (H:V)	2:1	2:1	2:1	2:1			
*Bottom Width (ft.)	0.00	0.00	0.00	0.00			
Peak Flow 10/6 (cfs)	0.31	1.15	0.06	0.39			
Peak Flow 10/24 (cfs)	0.53	1.96	0.10	0.66			
Flow Depth (ft.) 10/6	0.29	0.44	0.16	0.30			
Flow Depth (ft.) 10/24	0.36	0.54	0.19	0.37			
Flow Area (ft.2) 10/6	0.17	0.39	0.05	0.18			
Flow Area (ft.2) 10/24	0.26	0.59	0.07	0.27			
Velocity (fps) 10/6	1.80	2.93	1.22	2.11			
Velocity (fps) 10/24	2.05	3.35	1.39	2.41			
Rip-Rap Req'd (Y/N)	N	N	N	N			
Rip-Rap D ₅₀	-	-	_	-			
Note: Slope/Lengths from P	late 7-2.		-				

TABLE 9

Table 9 Disturbed Culvert Design Summary							
Culvert	DC-1	DC-2	DC-3	DC-4	DC-5	DC-6	
Slope (%)	13.33	10.77	3.03	21.50	12.00	5.00	
Length (ft.)	30	65	33	135	50	80	
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025	
Peak Flow 10/6 (cfs)	2.81	0.52	2.85	0.11	0.16	2.94	
Peak Flow 10/24 (cfs)	7.29	0.91	7.37	0.21	0.30	7.55	
Diam. Proposed (ft.)	1.50	1.50	1.50	1.50	1.50	2.00	
Velocity (fps) 10/24	10.72	5.31	5.94	4.35	3.95	7.27	
Rip-Rap D ₅₀	6"	6"	6"	N/A	N/A	6"	

Note: Slope/Lengths from Plate 7-5. Velocity: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 9 (Continued)

	Disturb	Table bed Culvert D	9 esign Summa	ry		
Culvert	DC-7	DC-8	DC-9	DC-10	DC-11	DC-12
Slope (%)	46.40	38.80	5.70	14.25	4.60	4.00
Length (ft.)	110	85	35	55	65	50
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	2.45	5.72	0.66	1.11	1.60	2.19
Peak Flow 10/24 (cfs)	4.31	13.22	1.15	1.94	2.80	3.73
Diam. Proposed (ft.)	1.50	2.00	1.50	1.50	1.50	1.50
Velocity (fps) 10/24	14.05	17.69	4.55	7.33	5.44	5.60
Rip-Rap D ₅₀	12"	12"	N/A	6"	6"	6"

Note: Slope/Lengths from Plate 7-5. Velocity: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 9 (Continued)

Table 9 Disturbed Culvert Design Summary						
Culvert	DC-13	DC-14	DC-15	DC-16	DC-17	DC-18
Slope (%)	3.33	3.33	3.33	3.33	4.00	5.70
Length (ft.)	30	60	60	60	75	35
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	6.35	0.79	0.11	0.31	1.32	0.06
Peak Flow 10/24 (cfs)	14.50	1.34	0.19	0.53	2.25	0.10
Diam. Proposed (ft.)	2.00	1.50	1.50	1.50	1.50	1.50
Velocity (fps) 10/24	7.34	3.93	2.20	2.99	4.87	2.19
Rip-Rap D ₅₀	6"	N/A	N/A	N/A	N/A	N/A

Note: Slope/Lengths from Plate 7-5.
Velocity: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 9 (Continued)

Table 9 Disturbed Culvert Design Summary						
Culvert	DC-19					
Slope (%)	2.50					
Length (ft.)	40					
Manning's No.	0.025					
Peak Flow 10/6 (cfs)	0.66					
Peak Flow 10/24 (cfs)	1.11					
Diam. Proposed (ft.)	1.50					
Velocity (fps) 10/24	3.36					
Rip-Rap D ₅₀	N/A					

Note: Slope/Lengths from Plate 7-5. Source: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 10

Table 10 Undisturbed Culvert Design Summary							
Culvert UC-1							
Slope (%)	0.50						
Length (ft.)	480						
Manning's No.	0.025						
Peak Flow 10/6 (cfs)	38.67						
Peak Flow 100/6 (cfs)	52.32						
Diam. Proposed (ft.)	4.00						
Velocity (fps) 100/6	4.79						

DESIGN OF SEDIMENT CONTROL STRUCTURES

Design Specifications:

- 3.1 Design and Construction Specifications for Sedimentation Pond
- 3.2 Sediment Yield
- 3.3 Sediment Pond Volume

Tables:

Table 11	Sediment Pond Design
Table 12a	Sediment Pond #1 - Stage Volume Data
Table 12b	Sediment Pond #2 - Stage Volume Data
Table 13a	Sediment Pond #1 - Stage Discharge Data
Table 13b	Sediment Pond #2 - Stage Discharge Data

3.4 Sediment Pond Summary

Figures:

Figure 5a	Sediment Pond #1 Stage-Volume Curve
Figure 5b	Sediment Pond #2 Stage-Volume Curve
Figure 6a	Sediment Pond #1 Stage-Discharge Curve
Figure 6b	Sediment Pond #2 Stage-Discharge Curve
Figure 7	Removal of Culvert UC-1 for Final Reclamation

3.1 Design and Construction Specifications for Sedimentation Pond

- a) All construction of sedimentation ponds will be performed under the direction of a qualified, registered professional engineer.
- The sediment pond #1 will be located in an existing low area where the Right Fork of Lila Canyon passes beneath the existing road. The existing road fill and culvert will be removed, and the pond embankment (road fill) will be reconstructed and compacted. The existing culvert will be replaced with UC-1 which will extend approximately 300' up the Right Fork of Lila Canyon. This culvert will be equipped with an inlet section and trash rack, and will allow undisturbed runoff and treated access road drainage to pass beneath the sediment pond. The majority of the pond will be in an existing channel area, and is therefore considered incised. The embankment will be reconstructed to a maximum of 2h:1v slopes, with the total of inside and outside slopes not less than 5h:1v. The pond will be equipped with a culvert riser principal spillway with an oil skimmer, a decant, and a second culvert riser emergency spillway with an oil skimmer. Both spillways will discharge to the oversized (60") CMP culvert running beneath the pond.
- c) The area of pond constructed shall be examined for topsoil, and where present in removable quantities, such soil shall be removed separately and stored in an approved topsoil storage location.
- d) In areas where fill is to be placed for the pond impoundment structures, natural ground shall be removed to at least 12" below the base of the structure.
- e) Native materials shall be used where practical. Fill will be placed in lifts not to exceed 6" and compacted prior to placement of next lift. Compaction of all fill materials shall be at least 95%.
- f) Rip-rap or other protection (culverts, concrete, etc.) will be placed at all pond inlets to prevent scouring. Rip-rap will consist of substantial, angular (non-slaking) rock material of adequate size.
- g) Decanting of the pond, as required, will be accomplished by use of a decant pipe with an inverted inlet as shown on Plate 7-6. Samples will be collected prior to decanting of the pond. If the quality of the water meets the requirements of the U.P.D.E.S. Permit, decanting will proceed. Discharge samples will be collected as per the approved U.P.D.E.S. Discharge Permit.

- h) Slopes of the embankments shall not be steeper than 2h:1v, inside or outside, with a total of the inslope and outslope not less than 5h:1v, except where areas of the pond are incised.
- i) External slopes of the impoundment will be planted with an approved seed mix to help prevent erosion and promote stability.
- j) Top width of the embankment shall be not less than (H+35)/5, where H = Height of Dam in feet.

3.2 Sediment Yield

The Universal Soil Equation (USLE) was used to estimate sediment yield from disturbed areas. All soil loss from this area was assumed to be delivered to, and deposited in the sedimentation pond.

Erosion rate (A) in tons-per-acre-per-year is determined using the USLE as follows:

$$A = (R) (K) (LS) (CP)$$

Where the variables R, K, LS, and CP are defined as follows:

Variable "R" is the rainfall factor which can be estimated from $R = 27P^{2.2}$; where P is the 2-year, 6-hour precipitation value. P for the Lila Canyon area is 0.75" as shown in Figure 5.4, page 315, Barfield, et.al. 1983. Therefore, the estimated value of "R" for this area is 14.34.

Variable "K" is the soil erodibility factor. For disturbed areas, the "K" value is conservatively estimated to be 0.5. For disturbed runoff, but uncompacted and ungraded areas, "K" is estimated at 0.320. "K" is estimated to be 0.035 for undisturbed areas.

Variable "LS" is the length-slope factor. This figure was determined by applying the slope length and percentage for each sub-drainage area to the chart in Figure 5.15, p. 334, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

Variable "CP" is the control practice factor, which can be divided into a cover and practice factor. Values were determined from Appendix 5A, Barfield, et.al., 1983.

Site	CP Factor	
Compacted Areas	1.20	
Disturbed/Uncompacted Areas	0.20	
Undisturbed Areas	0.15	

The sediment volume is based on a density of 100 pounds per cubic foot of sediment.

SEDIMENT YIELD CALCULATIONS - USLE - Sediment Pond #1

SEDIMENT YIELD CALCULATIONS - USLE - Sediment Pond #1									
Drainage	R	K	Acres	Slope	Slope	LS	CP	Α	Yield
				Length Feet	(%)				
DA-1a	14.34	0.500	0.33	680	22.35	12.50	1.20	107.55	0.0163
DA-1b	14.34	0.500	0.31	420	11.43	3.30	1.20	28.39	0.0040
DA-1c	14.34	0.500	0.20	225	8.89	1.70	1.20	14.63	0.0013
DA-2a	14.34	0.500	0.93	680	23.82	13.00	1.20	111.85	0.0478
DA-2b	14.34	0.500	0.14	350	10.29	2.80	1.20	24.09	0.0015
DA-2c	14.34	0.500	0.10	106	15.10	2.60	1.20	22.37	0.0010
DA-3	14.34	0.500	0.30	170	9.41	1.60	1.20	13.77	0.0019
DA-4a	14.34								

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							•		
-									

				0.14	100
D A -	4 b	14.34	0.500	0.12	270
D A -	4 c	14.34	0.500	0.60	5 8 0
D A -	5 a	14.34	0.500	0.07	180
D A -	5 b	14.34	0.500	0.33	125
D A -	5 c	14.34	0.500	0.42	5 7 0
D A -	6 a	14.34	0.500	0.28	200

L	ila Ca	nyon	Mine					:		
				SEDI	1 E N	ТҮ	E L D	C A	L C U	LATI
	Dra	in a g	е	R		K	A	cres	S	lope
										ength Feet
	D A - 1	4 a		1 4 . 3 4	0	.500	О	.3 6		3 9 0
	D A - 1	l 4 b		1 4 . 3 4	0	.500	0	.7 5		5 4 0
	D A - 1	l 5 a		1 4 . 3 4	0	.500	0	. 3 8		5 2 5
	D A - 1	l 5 b		1 4 . 3 4	0	.500	0	.62		2 7 0
	D A - 1	l 6 a		1 4 . 3 4	0	. 5 0 0	0	.16		3 7 0
	D A - 1	6 b		1 4 . 3 4	0	.500	0	. 0 9		2 1 0
	D A - 1	7 a		1 4 . 3 4	0	. 5 0 0	0	. 4 2		6 1 0
	D A - 1	7 b		1 4 . 3 4	0	.500	0	.07		1 0 0
	D A - 1	. 8 a		1 4 . 3 4	0	.500	0	.07		1 7 5

1 4 . 3 4 0 . 5 0 0 0 . 4 4

6 5 0

D A - 1 8 b

Li	la	Ca	n y	o r	n N	1 i	n e	!																							
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 																							S	e	d	i m	e :	n t	P	0 1	1
 1	. U	J s	e	1 .	9	0 '	1	f o	r	1	0	У	7 e	a	r	-	2	4	h	0	u r	•	e v	е	n	t.					
				-				21																				1			

- 2. Runoff Volume (from Table 5, 10 yr/24 hr) + in/ft) =
- 3. Sedim ent Storage Volum e
 USLE 0.9491 ac.ft./yr. x 3 yrs. =
- 4. Total Required Pond Volume
 4.68 + 2.85 =
- 5. P e a k F low (25 yr. 6 hr. event)* =
- 6. Pond Design Volume @ Principle Spillway =

Lila Canyo	n Mine			
				T A B L I
				T a b l e
				1 m ent
			Sta	ge/V olu
E le v a ti	o n	Area	V olum e	A c c
		(sq.ft.)	(ac. ft.)	(
5 8 3 0	2 2	6 2 0	0	0 .0 0 0
5 8 3 1	2 6	1 3 6	2 4 3 8 0	0 .5 6
5 8 3 2	2			

Appendix 7-4 Lila Canyon Mine Sedimentation and Drainage Control Plan



Revised
January 2001
October 2002 RJM
February 2007 TJS
April 2008 TJS
July 2008 TJS

SEDIMENTATION AND DRAINAGE CONTROL PLAN

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1	
1-	Introduction:
2-	Design of Drainage Control Structures:
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5-	Alternate Sediment Control for Fan, Water Treatment, and Topsoil Sites Page -56-

SEDIMENTATION AND DRAINAGE CONTROL PLAN

1- Introduction

The Sedimentation and Drainage Control Plan for the Lila Canyon Mine has been designed according to the State of Utah R645- Coal Mining Rules, November 1, 1996. All design criteria and construction will be certified by a Utah Registered Professional Engineer.

This plan has been divided into the following three sections:

- 1) Design of Drainage Control Structures for the Proposed Construction
- 2) Design of Sediment Control Structures
- 3) Design of Drainage Control Structures for Reclamation

The general surface water control plan for this project will consist of the following:

- (a) This is a new site construction. All areas proposed for disturbance will be sloped to drain to surface ditches and/or culverts where runoff will be carried to two sediment ponds. All minesite drainage controls and watersheds are shown on Plate 7-5 "Proposed Sediment Control Map".
- (b) The majority of undisturbed runoff will be diverted around the minesite and beneath the sediment pond #1 by properly sized culverts. Undisturbed diversion culvert UC-1, is located on the northwest end of the site. This diversion will allow the majority of undisturbed runoff from the Right Fork of Lila Canyon to bypass the mine area beneath sediment pond #1. All undisturbed diversions are designed to carry runoff from a 100 year 6 hour precipitation event. UC-1 is oversized at 60" diameter.

(c) Two adequately sized sediment ponds will be constructed at the lower end of the site. These ponds are sized to contain and treat the runoff from all of the disturbed area and any contributing undisturbed areas for a 10 year - 24 hour precipitation event. The ponds will be equipped with C.M.P. culvert principle spillway and decant and CMP culvert emergency spillway sized to safely pass runoff from a 25 year - 6 hour precipitation event. The spillways from sediment pond #1 will discharge into the UC-1 CMP culvert running beneath the pond. This culvert will discharge onto an engineered discharge structure and into the Right Fork of Lila Canyon channel below the minesite. The spillways from sediment pond #2 will discharge onto an engineered discharge structure and into the Middle Fork of Lila Canyon channel below the minesite.

DESIGN OF DRAINAGE CONTROL STRUCTURES

Design Parameters:

- 2.1 Precipitation
- 2.2 Flow
- 2.3 Velocity
- 2.4 Drainage Areas
- 2.5 Slope Lengths
- 2.6 Runoff
- 2.7 Runoff Curve Numbers
- 2.8 Culvert Sizing
- 2.9 Culverts
- 2.10 Main Canyon Culvert Outlet Structure
- 2.11 Ditches

Tables:

Table 1	Undisturbed Watershed Summary
Table 2	Disturbed Watershed Summary
Table 3	Watershed Parameters
Table 4	Runoff Summary - Undisturbed Watershed (Not Draining to Pond)
Table 5	Runoff Summary - Watersheds Draining to Sediment Pond
Table 6	Runoff Control Structure - Watershed Summary
Table 7	Runoff Control Structure - Flow Summary
Table 8	Disturbed Ditch Design Summary
Table 9	Disturbed Culvert Design Summary
Table 10	Undisturbed Culvert Design Summary

Figures:

Figure 1	Culvert Nomograph
Figure 2	Rip-Rap Chart
Figure 3	Disturbed Ditch Typical Section
Figure 4	Trash Rack - Culvert Inlet - Typical Section
Figure 4A	UC-1 Culvert Outlet

Design Parameters

2.1 Precipitation

The precipitation-frequency values for the area were taken from the approved Mining and Reclamation Plan, Horse Canyon Mine, Emery County, Utah, Volume III, submitted by I.P.A.

Frequency - Duration	Precipitation	
10 year - 6 hour	1.30"	
10 year - 24 hour	1.90"	
25 year - 6 hour	1.50"	
100 year - 6 hour	1.90"	

2.2 Flow

Peak flows, flow depths, areas and velocities were calculated using the computer program "Office of Surface Mining Watershed Model", <u>Storm Version 6.21</u> by Gary E. McIntosh. All flows are based on the SCS - TR55 Method for both SCS 6-hour and NOAA Type II, 24-hour storms.

Time of concentration of storm events was calculated for each drainage area using the SCS upland curve method included as part of the Storm software. For the undisturbed areas UA-1 and UA-4 the watershed type was set at forested and the curve condition was set at bare ground. For UA-6a and UA-6b and all DA watersheds, the watershed type was set as disturbed and the curve condition was set at bare ground.

2.3 Velocity

Flow velocities for each ditch structure were calculated using the Storm computer program with Manning's Formula:

$$V = 1.49 R^{2/3} S^{1/3}$$

where:

1983.

V = Velocity (fps)
R = Hydraulic Radius (ft.)
S = Slope (ft. per ft.)
n = Manning's n; Table 3.1, p. 159,

"Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner & Haan,

Note: The following Manning's n were used in the calculations:

Structure	Manning's n		
Culverts (cmp)	0.025		
Unlined Disturbed Area Ditches	0.035		

2.4 Drainage Areas

All drainage areas were planimetered directly from either Plate 7-1, "Permit Area Hydrology Map", and Plate 7-2, "Disturbed Area Hydrology/Watershed".

2.5 Slopes, Lengths

All slopes and lengths were measured directly from the topography on Plates 7-1 and 7-2.

2.6 Runoff Volume

Runoff was calculated using the SCS Formula for NOAA Type II, 24-hour storms; using the Storm Version 6.21 computer program:

$$Q = \frac{(P - 0.2 \text{ S})^2}{P + 0.8 \text{ S}}$$

where:

CN = Runoff Curve Number

Q = Runoff in inches

P = Precipitation in inches

 $S = \frac{1000}{\text{CN}} - 10$

2.7 Runoff Curve Numbers

Two curve numbers were utilized for the undisturbed areas. Areas with milder slopes (less than 30%) were given a runoff curve number of 75. All other undisturbed areas (30% slope or greater) were given a runoff curve number of 83. These numbers were taken directly from the approved "Mining and Reclamation Plan, Horse Canyon Mine, Emery County, Utah, Volume III", submitted by I.P.A. The numbers in that plan were based on vegetation and soils data from on-site.

Two other runoff curve numbers have been used in the calculations. A runoff CN of 90 is used for all disturbed areas (including the areas designated as undisturbed which lie within the disturbed area boundary (See Plate 7-2), and a runoff CN of 95 is used for paved areas. These numbers are based on commonly used and approved values and from Table 2.20, (p. 82, Barfield, et al, 1983).

The following is a summary of runoff curve numbers used in these calculations:

Watershed	Runoff CN	
Undisturbed (<30% slopes):	75	
Undisturbed (>30% slopes):	83	
Disturbed:	90	
Paved:	95	

Lila Canyon Mine

2.8 Culvert Sizing

Minimum culvert sizing is based on the either the inlet control nomograph or Manning's Equation. Culverts were evaluated for inlet control conditions to determine the minimum pipe size using the Culvert Nomograph included as Figure 1 of this Appendix. If the pipe had a HW/D ratio equal to or greater than 1.0 or the slope were less than 2% the Haestad Methods, Flowmaster, Version 6.0 computer program was used to determine the pipe flow diameter using:

$$D = (\frac{2.16 \ Q \ n}{\sqrt{s}})^{0.35}$$

where:

D = Required Diameter (feet)

Q = QP = Peak Discharge (cfs)

n = Roughness Factor (0.025 for CMP)

S = Slope (ft. per ft.)

2.9 Culverts

Culverts have been sized according to the calculations previously described, and are shown on Plate 7-5, "Proposed Sediment Control Map". Culverts carrying undisturbed drainages are designated with UC- Letters (i.e. UC-1). All undisturbed area drainage culverts will be fitted with trash racks to minimize plugging by rocks or other debris.

Trash racks will be provided at the inlet for all undisturbed drainage culverts. These will consist of 3/4" steel bars welded on 6" centers across the flared inlet structures of each culvert. Bars will be sloped from the front of the inlet structure up to the top of the culvert. This ramp configuration will allow trash, branches and other potential obstructions to be swept up and away from the inlet rather than being impinged against the grates during a flow event. Rip rap will be placed around the flared inlet structure and above it to a height of at least 6" above the required headwall for each culvert. (See Figure 4 for details). Trash racks will be checked on a routine schedule and following precipitation events and all trash, branches and other obstructions will be removed.

It should be noted that all undisturbed area culverts are adequately sized to handle the expected runoff from a 100 year - 6 hour event for maximum protection of the mine area, sediment pond and undisturbed drainage. This is well in excess of the 10 year - 6 hour event required by the regulations and is proposed as an extra measure of safety.

Disturbed area culverts and ditches are shown on the "Sediment Control Map", Plate 7-5. Culverts carrying disturbed drainage are designated with a DC-number (i.e. DC-1). Calculations for all disturbed area culverts and ditches are also included with this report, along with design criteria. Disturbed drainage areas draining to culverts and ditches are marked with a DA-number (i.e. DA-1). Undisturbed drainage areas are marked with a UA-number (i.e. UA-1).

Culverts will be inspected regularly, and cleaned as necessary to provide for passage of drainage flows. Inlets and outlets shall also be maintained so as to prevent plugging or undue restriction of water flow.

All disturbed area culverts are temporary, and will be removed upon final reclamation.

2.10 Main Canyon Culvert - Outlet Structure

The outlet of culvert UC-1 has been designed to flow onto a rip-rap apron to protect against souring and to allow for energy dissipation. The rip-rap apron is designed to fit the natural channel configuration as closely as possible, and will allow runoff to re-enter the natural channel at a reduced velocity which is no greater than natural flow conditions. Runoff from the 100 year - 6 hour precipitation event in the canyon below the minesite has been calculated at 52.32 cfs, including sediment pond overflow.

The rip-rap apron design is based on Figure 7-26, Design of Outlet Protection -Maximum Tailwater Condition, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983. Based on the figure, the apron should be a minimum of 15' in length, widening from 5' to 9', with a 0.1% slope. The proposed length has been increased to 20', to ensure adequate time for velocity reduction. The apron slope is kept at 0.1%. Rip-rap size is conservatively placed at 12" D₅₀. Rip-rap will be placed to a depth of 1.5 D_{50} and will be placed on a 6" layer of 2" drain rock filter. Rip-rap will also be placed on the 2H:1V side slopes to the height of the culvert (4') at the culvert outlet tapering to 3' at the outlet of the apron. This rip-rap apron has been sized and designed to adequately dissipate energy from flow velocities of a 100 year - 6 hour precipitation event and resist dislodgement. The drain rock filter bed will also serve to secure the rip-rap boulders firmly in place, to add an additional element of stability, and prevent scouring underneath the armored apron. (See Figure 4A for construction details). The natural channel below the culvert has a gradient of approximately 7.76%. When the flow is routed from the culvert across the apron to the natural channel, the velocity is reduced from 4.79 fps at the culvert outlet to 1.50 fps at the outlet of the apron. (See Culvert Outlet Rip-Rap Apron Flow Velocity Calculations in Appendix 1.)

It should be noted that these calculations are based on a 100 year - 6 hour event.

2.11 Ditches

All ditches will carry disturbed area drainage to the pond. Ditches are shown on the Proposed Sediment Control Map, Plate 7-5, and are designated with a DD-number (i.e. DD-1 for Disturbed Area Ditches) or UD-number (i.e. UD-1 for Undisturbed Area Ditches).

All ditches are designed to carry the expected runoff from a 10 year - 6 hour event with a minimum freeboard of 0.5' (See Table 8 and Figure 3).

Ditches which exhibit expected flow velocities of 5 fps or greater will be lined with riprap. A typical cross-section is shown on Figure 3 and flow depths and areas for all lined and unlined ditches are presented in Table 8 of this report.

Ditch slopes have been determined from Plates 7-2 and 7-5.

All ditches will be inspected regularly, and maintained to the minimum dimensions to provide adequate capacity for the design flow. All ditches are temporary and will be removed as described under the reclamation hydrology section. (Section 4)

TABLE 1

Table 1 Undisturbed Watershed Summary					
Watershed Drains To Final					
UA-1	UC-1	Lila Canyon			
UA-2	DD-2	Sediment Pond			
UA-4	Sediment Pond	Sediment Pond			
UA-6a	DD-12	Sediment Pond			
UA-6b	DD-11	Sediment Pond			
UA-7	ASCA Area	Lila Canyon			
UA-8	ASCA Area	Lila Canyon			

TABLE 2

Table 2							
Disturbed Watershed Summary							
Watershed Drains To Final							
DA-1a	DD-1a	Sediment Pond					
DA-1b	DD-1b	Sediment Pond					
DA-1c	DD-1c	Sediment Pond					
DA-2a	DD-2a	Sediment Pond					
DA-2b	DD-2b	Sediment Pond					
DA-2c	DD-2c	Sediment Pond					
DA-3	DD-3	Sediment Pond					
DA-4a	DD-4a	Sediment Pond					
DA-4b	DD-4b	Sediment Pond					
DA-4c	DD-4c	Sediment Pond					
DA-5a	DD-5a	Sediment Pond					
DA-5b	DD-5b	Sediment Pond					
DA-5c	DD-5c	Sediment Pond					
DA-6a	DD-6a	Sediment Pond					
DA-6b	DD-6b	Sediment Pond					
DA-6c	DD-6c	Sediment Pond					
DA-7	DD-7	Sediment Pond					
DA-8a	DD-8a	Sediment Pond					
DA-8b	DD-8b	Sediment Pond					
DA-8c	DD-8c	Sediment Pond					
DA-9	DD-9	Sediment Pond					
DA-10	DD-10	Sediment Pond					
DA-11	DD-11	Sediment Pond					
DA-13a	DD-13a	Sediment Pond					
DA-13b	DD-13d	Sediment Pond					
DA-13c	DD-13e	Sediment Pond					
DA-14a	DD-14a	Sediment Pond 2					
DA-14b	DD-14b	Sediment Pond 2					
DA-15a	DD-15a	Sediment Pond 2					
DA-15b	DD-15b	Sediment Pond 2					
DA-16a	DD-16a	Sediment Pond 2					
DA-16b	DD-16b	Sediment Pond 2					
DA-17a	DD-17a	Sediment Pond 2					
DA-17b	DD-17b	Sediment Pond 2					
DA-18a	DD-18a	Sediment Pond 2					
DA-18b	DD-18b	Sediment Pond 2					
TS-1	Topsoil Berm	Sediment Pond					
POND	Sediment Pond	Sediment Pond					

TABLE 3

		TAB	LE 3					
	Table 3 Watershed Parameters							
Watershed	% Slope	CN						
	Undisturbed Watersheds							
UA-1	248.41	5200	1480	28.46	75			
UA-2	10.01	1500	1000	66.67	83			
UA-4	14.08		595	47.76	83			
	1.45	230	80	34.70	90			
UA-6b	0.40	90	30	33.33	90			
UA-7	0.60	195	25	12.80	90			
UA-8	0.37	100	30	30.00	90			
		Disturbed V	Vatersheds					
DA-1a	0.33	680	152	22.35	95			
DA-1b	0.31	420	48	11.43	95			
DA-1c	0.20	225	20	8.89	95			
DA-2a	0.93	680	162	23.82	95			
DA-2b	0.14	350	36	10.29	95			
DA-2c	0.10	106	16	15.10	95			
DA-3	0.30	170	16	9.41	90			
DA-4a	0.14	100	12	12.00	95			
DA-4b	0.12	270	28	10.37	95			
DA-4c	0.60	580	54	9.31	95			
DA-5a	0.07	180	24	13.33	95			
DA-5b	0.33	125	14	11.20	90			
DA-5c	0.42	570	54	9.47	95			
DA-6a	0.28		54	27.	90			
DA-6b	3.35	760	70	9.21	90			
DA-6c	2.51	690	70	10.14	90			
DA-7	2.68	630	30	4.76	95			
DA-8a	0.26	284	54	19.01	90			
DA-8b	0.76	670	52	7.80	90			
DA-8c	0.95	410	42	10.24	90			
DA-9	0.05	50	6	12.00	95			
DA-10	2.89	700	20	2.86	95			
DA-11	0.78	340	16	4.70	95			
DA-13a	1.97	470	12	2.55	95			
DA-13b	0.49	280	4	1.43	90			
DA-13c	0.40	460	22	4.78	90			
DA-14a	0.36	390	34	8.71	95			

TABLE 3 (Continued)

Table 3 Watershed Parameters						
Watershed Area Hydraulic Elevation Change (ft.)					CN	
		Disturbed V	Watersheds			
DA-14b	0.75	540	16	2.96	95	
DA-15a	0.38	525	50	9.52	95	
DA-15b	0.62	270	12	4.44	95	
DA-16a	0.16	370	10	2.70	95	
DA-16b	0.09	210	13	6.19	95	
DA-17a	0.42	610	19	3.11	95	
DA-17b	0.07	100	5	5.00	95	
DA-18a	0.07	175	6	3.43	95	
DA-18b	0.44	650	24	3.69	95	
TS-1	2.95	660	38	5.75	83	
POND	1.92	380	50	13.16	95	

TABLE 4

Table 4 Runoff Summary Undisturbed Watersheds (Not Draining to Ponds)

Watershed	10 yr. / 6 hr. Peak Flow - cfs	25 yr. / 6 hr. Peak Flow - cfs	100 yr. / 6 hr. Peak Flow - cfs	10 yr. / 24 hr. Peak Flow - cfs	10 yr. / 24 hr. Volume -
UA-1	7.02	10.31	20.48	25.53	ac.ft.
UA-7	0.21	0.27	0.40	0.43	0.03
UA-8	0.14	0.18	0.26	0.14	0.03

TABLE 5

Table 5 Runoff Summary Watershed Drainage to Sediment Pond					
Watershed	10 yr. / 6 hr. Peak Flow-cfs	25 yr. / 6 hr. Peak Flow-cfs	10 yr. / 24 hr. Peak Flow-cfs	10 yr. / 24 hr. Volume-ac-ft	
	Undisturbe	d Watersheds draining t	to Pond #1		
UA-2	2.11	3.11	6.11	0.52	
UA-4	3.14	4.65	9.20	0.74	
UA-6a	0.47	0.60	0.95	0.12	
UA-6b	0.10	0.13	0.21	0.03	
	Disturbed	Watersheds draining to			
DA-1a	0.22	0.26	0.37	0.04	
DA-1b	0.20	0.24	0.33	0.04	
DA-1c	0.11	0.14	0.19	0.02	
DA-2a	0.61	0.73	1.03	0.11	
DA-2b	0.09	0.10	0.15	0.02	
DA-2c	0.04	0.05	0.08	0.01	
DA-3	0.11	0.14	0.21	0.03	
DA-4a	0.06	0.08	0.11	0.02	
DA-4b	0.07	0.08	0.12	0.01	
DA-4c	0.42	0.51	0.71	0.07	
DA-5a	0.05	0.06	0.09	0.01	
DA-5b	0.11	0.14	0.21	0.03	
DA-5c	0.29	0.35	0.49	0.05	
DA-6a	0.09	0.12	0.18	0.02	
DA-6b	1.60	2.06	3.27	0.28	
DA-6c	1.18	1.52	2.40	0.21	
DA-7	1.98	2.39	3.36	0.31	
DA-8a	0.10	0.12	0.19	0.02	
DA-8b	0.36	0.47	0.74	0.06	
DA-8c	0.40	0.52	0.81	0.08	
DA-9	0.04	0.05	0.07	0.01	
DA-10	2.19	2.65	3.73	0.33	
DA-11	0.52	0.63	0.89	0.09	
DA-13a	1.46	1.76	2.47	0.23	
DA-13b	0.23	0.30	0.47	0.04	
DA-13c	0.19	0.24	0.38	0.03	
TS-1	0.65	0.96	1.90	0.15	
POND	1.18	1.42	1.99	0.22	
TOTAL		26.58		3.95	

TABLE 5 (Continued)

Table 5 Runoff Summary Watershed Drainage to Sediment Pond									
Watershed	10 yr. / 6 hr. Peak Flow-cfs								
	Disturbed	Watersheds draining to	Pond #2						
DA-14a	0.23	0.28	0.39	0.04					
DA-14b	0.56	0.67	0.95	0.09					
DA-15a	0.26	0.31	0.44	0.04					
DA-15b	0.40	0.48	0.67	0.07					
DA-16a	0.11	0.14	0.19	0.02					
DA-16b	0.06	0.07	0.10	0.01					
DA-17a	0.31	0.38	0.53	0.05					
DA-17b	0.05	0.06	0.09	0.01					
DA-18a	0.06	0.07	0.10	0.01					
DA-18b	0.33	0.40	0.56	0.05					
TOTAL		2.86		0.					

TABLE 6

	Table 6 Runoff Control Structure Watershed Summary						
Structure	Туре	Contributing Watersheds/Structures					
UC-1	Culvert	UA-1, UA-7, Sediment Pond Overflow					
DD-1a	Ditch	DA-1a					
DD-1b	Ditch	DD-1a, DA-1b, UA-6b					
DC-2	Culvert	DD-1b					
DD-1c	Ditch	DC-2, DA-1c					
DD-2a	Ditch	DA-2a, UA-2					
DD-2b	Ditch	DD-2a, DA-2b					
DC-1	Culvert	DD-2b, UA-2					
DD-2c	Ditch	DC-1, DA-2c					
DC-3	Culvert	DD-2c					
DD-3	Ditch	DA-3					
DC-4	Culvert	DD-3					
DD-4a	Ditch	DA-4a					
DD-4b	Ditch	DD-4a, DC-4, DA-4b					
DC-20	Culvert	DD-4b					
DD-4c	Ditch	Dc-20, DA-4c					
DC-9	Culvert	DD-4c					
DD-5a	Ditch	DA-5a					
DD-5b	Ditch	DD-5a, DA-5b					
DC-5	Culvert	DD-5b					
DD-5c	Ditch	DC-5, DA-5c					
DC-10	Culvert	DD-5c, DC-9					
DD-6a	Ditch	DC-3, DD-1c, DA-6a					

	Table 6 Runoff Control Structure Watershed Summary						
Structure	Туре	Contributing Watersheds/Structures					
DC-6	Culvert	DD-6a					
DD-6b	Ditch	DC-6, DA-6b					
DD-6c	Ditch	DA-6c					
DC-8	Culvert	DD-6b, DD-6c					
DD-7	Ditch	DA-7					
DC-7	Culvert	DD-7					
DD-8a	Ditch	DA-8a					
DD-8b	Ditch	DD-8a, DC-7, DA-8b					
DD-8c	Ditch	DD-8b, DC-8, DA-8c					
DD-9	Ditch	DC-10, DD-5c, DA-9					
DC-11	Culvert	DD-9					
DD-10	Ditch	DA-10					
DC-12	Culvert	DD-10					
DD-11	Ditch	DA-11					
DD-12	Ditch	DD-7, UA-6a					
DD-13a	Ditch	DC-11, DA-13a					
DD-13b	Ditch	DD-13a, DD-11					
DD-13c	Ditch	DD-13b, DC-12					
DD-13d	Ditch	DD-13c, DD-8c, DD-13b					
DC-13	Culvert	DD-13d					
DD-13e	Ditch	DC-13, DA-13c					
DD-14a	Ditch	DA-14a					
DD-14b	Ditch	DA-14b					
DC-14	Culvert	DD-14a, DD-14b					
DD-15a	Ditch	DA-15a					

Table 6 Runoff Control Structure Watershed Summary						
Structure	Туре	Contributing Watersheds/Structures				
DD-15b	Ditch	DD-15a, DA-15b				
DC-19	Culvert	DD-15b				
DD-16a	Ditch	DA-16a				
DC-15	Culvert	DD-16a				
DD-16b	Ditch	DC-15, DA-16b				
DD-17a	Ditch	DA-17a				
DC-16	Culvert	DD-17a				
DD-17b	Ditch	DC-16, DC-14, DA-17b				
DC-17	Culvert	DD-17b, DD-16b				
DD-18a	Ditch	DA-18a				
DC-18	Culvert	DD-18a				
DD-18b	Ditch	DC-18, DA-18b				

DD-12 does not exist.

TABLE 7

Table 7 Runoff Control Structure Flow Summary									
Structure	Туре	10yr. / 6hr. Peak Flow-cfs	10yr. / 24hr. Peak Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs				
UC-1	Culvert	38.67	57.40	42.02	52.32				
DD-1a	Ditch	0.22	0.37	0.26					
DD-1b	Ditch	0.52	0.91	0.63					
DC-2	Culvert	0.52	0.91	0.63					
DD-1c	Ditch	0.63	1.10	0.77					
DD-2a	Ditch	2.72	7.14	3.84					
DD-2b	Ditch	2.81	7.29	3.94					
DC-1	Culvert	2.81	7.29	3.94					
DD-2c	Ditch	2.85	7.37	3.99					
DC-3	Culvert	2.85	7.37	3.99					
DD-3	Ditch	0.11	0.21	0.14					
DC-4	Culvert	0.11	0.21	0.14					
DD-4a	Ditch	0.06	0.11	0.08					
DD-4b	Ditch	0.24	0.44	0.30					
DC-20	Culvert	0.24	0.44	0.30	'				
DD-4c	Ditch	0.66	1.15	0.81					
DC-9	Culvert	0.66	1.15	0.81					
DD-5a	Ditch	0.05	0.09	0.06					
DD-5b	Ditch	0.16	0.30	0.20					
DC-5	Culvert	0.16	0.30	0.20					
DD-5c	Ditch	0.45	0.79	0.55					
DC-10	Culvert	1.11	1.94	1.36					
DD-6a	Ditch	2.94	7.55	4.11	:				

DD-15a

Ditch

0.26

Type Culvert Ditch	10yr. / 6hr. Peak Flow-cfs 2.94	10yr. / 24hr. Peak Flow-cfs	25yr. / 6hr.	100yr. / 6hr.
	2.94		Peak Flow-cfs	Peak Flow-cfs
Ditch		7.55	4.11	
	4.54	10.82	6.17	
Ditch	1.18	2.40	1.52	
Culvert	5.72	13.22	7.69	
Ditch	2.45	4.31	2.99	
Culvert	2.45	4.31	2.99	
Ditch	0.10	0.19	0.12	
Ditch	2.91	5.24	3.58	
Ditch	6.12	14.03	8.21	
Ditch	0.04	2.80	1.96	
Culvert	1.60	2.80	1.96	
Ditch	2.19	3.73	2.65	
Culvert	2.19	3.73	2.65	
Ditch	0.52	0.89	0.63	
Ditch	3.06	5.27	3.72	
Ditch	3.58	6.16	4.35	
Ditch	5.77	9.89	7.00	
Ditch	6.35	14.50	8.51	
Culvert	6.35	14.50	8.51	
Ditch	6.54	14.88	8.75	
Ditch	0.23	0.39	0.28	
Ditch	0.56	0.95	0.67	
Culvert	0.79	1.34	0.95	
	Ditch Culvert Ditch Ditch Ditch Ditch Ditch Ditch Ditch Culvert Ditch Culvert Ditch Culvert Ditch Culvert Ditch	Ditch 1.18 Culvert 5.72 Ditch 2.45 Culvert 2.45 Ditch 0.10 Ditch 2.91 Ditch 6.12 Ditch 0.04 Culvert 1.60 Ditch 2.19 Culvert 2.19 Ditch 0.52 Ditch 3.06 Ditch 3.58 Ditch 5.77 Ditch 6.35 Culvert 6.35 Ditch 6.54 Ditch 0.23 Ditch 0.56	Ditch 1.18 2.40 Culvert 5.72 13.22 Ditch 2.45 4.31 Culvert 2.45 4.31 Ditch 0.10 0.19 Ditch 0.10 0.19 Ditch 2.91 5.24 Ditch 6.12 14.03 Ditch 0.04 2.80 Culvert 1.60 2.80 Ditch 2.19 3.73 Culvert 2.19 3.73 Ditch 0.52 0.89 Ditch 3.06 5.27 Ditch 3.58 6.16 Ditch 5.77 9.89 Ditch 6.35 14.50 Culvert 6.35 14.50 Ditch 6.54 14.88 Ditch 0.23 0.39 Ditch 0.56 0.95	Ditch 1.18 2.40 1.52 Culvert 5.72 13.22 7.69 Ditch 2.45 4.31 2.99 Culvert 2.45 4.31 2.99 Ditch 0.10 0.19 0.12 Ditch 2.91 5.24 3.58 Ditch 6.12 14.03 8.21 Ditch 0.04 2.80 1.96 Culvert 1.60 2.80 1.96 Ditch 2.19 3.73 2.65 Culvert 2.19 3.73 2.65 Ditch 0.52 0.89 0.63 Ditch 3.06 5.27 3.72 Ditch 3.58 6.16 4.35 Ditch 5.77 9.89 7.00 Ditch 6.35 14.50 8.51 Culvert 6.35 14.50 8.51 Ditch 6.54 14.88 8.75 Ditch 0.56 0.95 <

0.44

0.31

Table 7 Runoff Control Structure Flow Summary									
Structure	Туре	10yr. / 6hr. Peak Flow-cfs	10yr. / 24hr. Peak Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs				
DD-15b	Ditch	0.66	1.11	0.79					
DC-19	Culvert	0.66	1.11	0.79					
DD-16a	Ditch	0.11	0.19	0.14					
DC-15	Culvert	0.11	0.19	0.14					
DD-16b	Ditch	0.17	0.29	0.21					
DD-17a	Ditch	0.31	0.53	0.38					
DC-16	Culvert	0.31	0.53	0.38					
DD-17b	Ditch	1.15	1.96	1.39					
DC-17	Culvert	1.32	2.25	1.60					
DD-18a	Ditch	0.06	0.10	0.07					
DC-18	Culvert	0.06	0.10	0.07					
DD-18b	Ditch	0.39	0.66	0.47					

DD-12 does not exist.

UC-1 flow values include 25 yr-6 hr sediment pond peak flow 31.44 cfs.

TABLE 8

Table 8 Disturbed Ditch Design Summary									
Ditch	DD-1a	DD-1b	DD-1c	DD-2a	DD-2b	DD-2c			
Slope (%)	11.42	11.20	10.00	12.06	10.29	14.29			
Length (ft.)	683	420	20	680	350	105			
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035			
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1			
*Bottom Width (ft.)	0.00	0.00	0.00	2.00	2.00	2.00			
Peak Flow 10/6 (cfs)	0.22	0.52	0.63	2.72	2.81	2.85			
Peak Flow 10/24 (cfs)	0.37	0.91	1.10	7.14	7.29	7.37			
Flow Depth (ft.) 10/6	0.20	0.27	0.30	0.23	0.24	0.22			
Flow Depth (ft.) 10/24	0.24	0.34	0.37	0.39	0.42	0.38			
Flow Area (ft.2) 10/6	0.08	0.15	0.18	0.56	0.61	0.55			
Flow Area (ft.2) 10/24	0.11	0.23	0.27	1.10	1.18	1.06			
Velocity (fps) 10/6	2.84	3.49	3.51	4.81	4.61	5.18			
Velocity (fps) 10/24	3.23	4.02	4.04	6.49	6.18	6.96			
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N			
Rip-Rap D ₅₀	-	-	-	-	-	-			
Note: Slope/Lengths from I	Plate 7-2.								

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary										
Ditch	DD-3	DD-4a	DD-4b	DD-4c	DD-5a	DD-5b	DD-5c			
Slope (%)	0.60	11.00	10.26	10.00	13.11	11.11	9.52			
Length (ft.)	171	100	273	580	183	126	567			
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035			
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1			
*Bottom Width (ft.)	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Peak Flow 10/6 (cfs)	0.11	0.06	0.24	0.66	0.05	0.16	0.45			
Peak Flow 10/24 (cfs)	0.21	0.11	0.44	1.15	0.09	0.30	0.79			
Flow Depth (ft.) 10/6	0.26	0.12	0.21	0.30	0.11	0.18	0.27			
Flow Depth (ft.) 10/24	0.34	0.15	0.26	0.38	0.14	0.22	0.33			
Flow Area (ft.2) 10/6	0.14	0.03	0.09	0.19	0.02	0.06	0.14			
Flow Area (ft.2) 10/24	0.23	0.05	0.14	0.28	0.04	0.10	0.22			
Velocity (fps) 10/6	0.79	2.02	2.79	3.55	2.06	2.59	3.17			
Velocity (fps) 10/24	0.93	2.35	3.24	4.08	2.39	3.04	3.65			
Rip-Rap Req'd (Y/N)	N	N	N	N :	N	N	N			
Rip-Rap D ₅₀	-		-	-	-	-	-			
Note: Slope/Lengths from F	Note: Slope/Lengths from Plate 7-2.									

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary									
Ditch	DD-6a	DD-6b	DD-6c	DD-7	DD-8a	DD-8b	DD-8c		
Slope (%)	18.00	2.56	3.38	1.08	20.42	7.81	10.34		
Length (ft.)	200	507	532	370	284	666	406		
Manning's No.	0.040	0.035	0.035	0.035	0.035	0.035	0.040		
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1		
*Bottom Width (ft.)	3.00	1.00	1.00	1.00	0.00	1.00	2.00		
Peak Flow 10/6 (cfs)	2.94	4.54	1.18	2.45	0.10	2.91	6.12		
Peak Flow 10/24 (cfs)	7.55	10.82	2.40	4.31	0.19	5.24	14.03		
Flow Depth (ft.) 10/6	0.19	0.60	0.28	0.55	0.13	0.37	0.41		
Flow Depth (ft.) 10/24	0.32	0.90	0.41	0.72	0.17	0.49	0.63		
Flow Area (ft.2) 10/6	0.62	1.32	0.45	1.15	0.03	0.63	1.14		
Flow Area (ft.2) 10/24	1.17	2.52	0.75	1.75	0.06	0.98	2.07		
Velocity (fps) 10/6	4.71	3.43	2.64	2.12	2.90	4.59	5.35		
Velocity (fps) 10/24	6.47	4.29	3.21	2.46	3.40	5.37	6.78		
Rip-Rap Req'd (Y/N)	Y	N	N	N	N	N	Y		
Rip-Rap D ₅₀	6"	-	-	-	-	-	6"		
Note: Slope/Lengths from P	late 7-2.		-		•				

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary								
Ditch	DD-9	DD-10	DD-11	DD-13a	DD-13b	DD-13c	DD-13d	
Slope (%)	10.00	3.02	5.06	2.53	3.23	3.30	1.25	
Length (ft.)	50	696	336	474	62	38	278	
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035	
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1	
*Bottom Width (ft.)	0.00	1.00	0.00	1.00	1.00	1.00	3.00	
Peak Flow 10/6 (cfs)	0.04	2.19	0.52	3.06	3.58	5.77	6.35	
Peak Flow 10/24 (cfs)	0.07	3.73	0.89	5.27	6.16	9.89	14.50	
Flow Depth (ft.) 10/6	0.11	0.40	0.32	0.50	0.51	0.63	0.57	
Flow Depth (ft.) 10/24	0.13	0.53	0.39	0.65	0.66	0.82	0.89	
Flow Area (ft.2) 10/6	0.02	0.73	0.20	0.99	1.02	1.44	2.36	
Flow Area (ft.2) 10/24	0.03	1.08	0.30	1.48	1.52	2.15	4.25	
Velocity (fps) 10/6	1.76	3.00	2.59	3.08	3.51	4.01	2.69	
Velocity (fps) 10/24	2.03	3.46	2.97	3.55	4.05	4.61	3.41	
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N	N	
Rip-Rap D ₅₀	-	-	-	-	-	-	-	
Note: Slope/Lengths from P	Note: Slope/Lengths from Plate 7-2.							

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary								
Ditch	DD-13e	DD-14a	DD-14b	DD-15a	DD-15b	DD-16a	DD-16b	
Slope (%)	4.78	8.72	3.15	9.70	4.07	2.97	6.06	
Length (ft.)	460	390	540	525	270	370	165	
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035	
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1	
*Bottom Width (ft.)	3.00	0.00	0.00	0.00	0.00	0.00	0.00	
Peak Flow 10/6 (cfs)	6.54	0.23	0.56	0.26	0.66	0.11	0.17	
Peak Flow 10/24 (cfs)	14.88	0.39	0.95	0.44	1.11	0.19	0.29	
Flow Depth (ft.) 10/6	0.40	0.21	0.36	0.22	0.36	0.20	0.20	
Flow Depth (ft.) 10/24	0.63	0.26	0.43	0.26	0.44	0.24	0.25	
Flow Area (ft.2) 10/6	1.52	0.09	0.25	0.09	0.26	0.08	0.08	
Flow Area (ft.2) 10/24	2.68	0.13	0.38	0.14	0.38	0.12	0.12	
Velocity (fps) 10/6	4.31	2.59	2.21	2.78	2.54	1.44	2.10	
Velocity (fps) 10/24	5.54	2.96	2.52	3.18	2.89	1.65	2.40	
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N	N	
Rip-Rap D ₅₀	-	-	-	-	-	-	-	
Note: Slope/Lengths from Pl	ate 7-2.							

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-17a	DD-17b	DD-18a	DD-18b			
Slope (%)	2.68	4.12	2.86	3.54			
Length (ft.)	485	97	175	650			
Manning's No.	0.035	0.035	0.035	0.035			
Side Slope (H:V)	2:1	2:1	2:1	2:1			
*Bottom Width (ft.)	0.00	0.00	0.00	0.00			
Peak Flow 10/6 (cfs)	0.31	1.15	0.06	0.39			
Peak Flow 10/24 (cfs)	0.53	1.96	0.10	0.66			
Flow Depth (ft.) 10/6	0.29	0.44	0.16	0.30			
Flow Depth (ft.) 10/24	0.36	0.54	0.19	0.37			
Flow Area (ft.2) 10/6	0.17	0.39	0.05	0.18			
Flow Area (ft.2) 10/24	0.26	0.59	0.07	0.27			.,
Velocity (fps) 10/6	1.80	2.93	1.22	2.11			
Velocity (fps) 10/24	2.05	3.35	1.39	2.41			
Rip-Rap Req'd (Y/N)	N	N	N	N			
Rip-Rap D ₅₀	-	-	-	-		:	
Note: Slope/Lengths from Pla	te 7-2.			-	•	•	

TABLE 9

Table 9 Disturbed Culvert Design Summary						
Culvert	DC-1	DC-2	DC-3	DC-4	DC-5	DC-6
Slope (%)	13.33	10.77	3.03	21.50	12.00	5.00
Length (ft.)	30	65	33	135	50	80
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	2.81	0.52	2.85	0.11	0.16	2.94
Peak Flow 10/24 (cfs)	7.29	0.91	7.37	0.21	0.30	7.55
Diam. Proposed (ft.)	1.50	1.50	1.50	1.50	1.50	2.00
Velocity (fps) 10/24	10.72	5.31	5.94	4.35	3.95	7.27
Rip-Rap D ₅₀	6"	6"	6"	N/A	N/A	6"

Note: Slope/Lengths from Plate 7-5. Velocity: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 9 (Continued)

Table 9 Disturbed Culvert Design Summary						
Culvert	DC-7	DC-8	DC-9	DC-10	DC-11	DC-12
Slope (%)	46.40	38.80	5.70	14.25	4.60	4.00
Length (ft.)	110	85	35	55	65	50
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	2.45	5.72	0.66	1.11	1.60	2.19
Peak Flow 10/24 (cfs)	4.31	13.22	1.15	1.94	2.80	3.73
Diam. Proposed (ft.)	1.50	2.00	1.50	1.50	1.50	1.50
Velocity (fps) 10/24	14.05	17.69	4.55	7.33	5.44	5.60
Rip-Rap D ₅₀	12"	12"	N/A	6"	6"	6"

Note: Slope/Lengths from Plate 7-5. Velocity: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 9 (Continued)

Table 9 Disturbed Culvert Design Summary						
Culvert	DC-13	DC-14	DC-15	DC-16	DC-17	DC-18
Slope (%)	3.33	3.33	3.33	3.33	4.00	5.70
Length (ft.)	30	60	60	60	75	35
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	6.35	0.79	0.11	0.31	1.32	0.06
Peak Flow 10/24 (cfs)	14.50	1.34	0.19	0.53	2.25	0.10
Diam. Proposed (ft.)	2.00	1.50	1.50	1.50	1.50	1.50
Velocity (fps) 10/24	7.34	3.93	2.20	2.99	4.87	2.19
Rip-Rap D ₅₀	6"	N/A	N/A	N/A	N/A	N/A

Note: Slope/Lengths from Plate 7-5. Velocity: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 9 (Continued)

	Disturbed Cu	Table 9 ılvert Design Su	mmary	
Culvert	DC-19			
Slope (%)	2.50			
Length (ft.)	40			
Manning's No.	0.025			
Peak Flow 10/6 (cfs)	0.66			
Peak Flow 10/24 (cfs)	1.11			
Diam. Proposed (ft.)	1.50			
Velocity (fps) 10/24	3.36			
Rip-Rap D ₅₀	N/A			

Note: Slope/Lengths from Plate 7-5.

Source: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 10

	Table 10 ılvert Design Summary	
Culvert	UC-1	
Slope (%)	0.50	
Length (ft.)	480	
Manning's No.	0.025	
Peak Flow 10/6 (cfs)	38.67	
Peak Flow 100/6 (cfs)	52.32	
Diam. Proposed (ft.)	4.00	
Velocity (fps) 100/6	4.79	

^{*} Note: Peak Flows include 25 year - 6 hour design overflow 31.44 cfs from sediment pond.

DESIGN OF SEDIMENT CONTROL STRUCTURES

Design Specifications:

- 3.1 Design and Construction Specifications for Sedimentation Pond
- 3.2 Sediment Yield
- 3.3 Sediment Pond Volume

Tables:

Table 11	Sediment Pond Design
Table 12a	Sediment Pond #1 - Stage Volume Data
Table 12b	Sediment Pond #2 - Stage Volume Data
Table 13a	Sediment Pond #1 - Stage Discharge Data
Table 13b	Sediment Pond #2 - Stage Discharge Data

3.4 Sediment Pond Summary

Figures:

Figure 5a	Sediment Pond #1 Stage-Volume Curve
Figure 5b	Sediment Pond #2 Stage-Volume Curve
Figure 6a	Sediment Pond #1 Stage-Discharge Curve
Figure 6b	Sediment Pond #2 Stage-Discharge Curve
Figure 7	Removal of Culvert UC-1 for Final Reclamation

3.1 Design and Construction Specifications for Sedimentation Pond

- a) All construction of sedimentation ponds will be performed under the direction of a qualified, registered professional engineer.
- The sediment pond #1 will be located in an existing low area where the Right Fork of Lila Canyon passes beneath the existing road. The existing road fill and culvert will be removed, and the pond embankment (road fill) will be reconstructed and compacted. The existing culvert will be replaced with UC-1 which will extend approximately 300' up the Right Fork of Lila Canyon. This culvert will be equipped with an inlet section and trash rack, and will allow undisturbed runoff and treated access road drainage to pass beneath the sediment pond. The majority of the pond will be in an existing channel area, and is therefore considered incised. The embankment will be reconstructed to a maximum of 2h:1v slopes, with the total of inside and outside slopes not less than 5h:1v. The pond will be equipped with a culvert riser principal spillway with an oil skimmer, a decant, and a second culvert riser emergency spillway with an oil skimmer. Both spillways will discharge to the oversized (60") CMP culvert running beneath the pond.
- c) The area of pond constructed shall be examined for topsoil, and where present in removable quantities, such soil shall be removed separately and stored in an approved topsoil storage location.
- d) In areas where fill is to be placed for the pond impoundment structures, natural ground shall be removed to at least 12" below the base of the structure.
- e) Native materials shall be used where practical. Fill will be placed in lifts not to exceed 6" and compacted prior to placement of next lift. Compaction of all fill materials shall be at least 95%.
- f) Rip-rap or other protection (culverts, concrete, etc.) will be placed at all pond inlets to prevent scouring. Rip-rap will consist of substantial, angular (non-slaking) rock material of adequate size.
- g) Decanting of the pond, as required, will be accomplished by use of a decant pipe with an inverted inlet as shown on Plate 7-6. Samples will be collected prior to decanting of the pond. If the quality of the water meets the requirements of the U.P.D.E.S. Permit, decanting will proceed. Discharge samples will be collected as per the approved U.P.D.E.S. Discharge Permit.

- h) Slopes of the embankments shall not be steeper than 2h:1v, inside or outside, with a total of the inslope and outslope not less than 5h:1v, except where areas of the pond are incised.
- i) External slopes of the impoundment will be planted with an approved seed mix to help prevent erosion and promote stability.
- j) Top width of the embankment shall be not less than (H+35)/5, where H = Height of Dam in feet.

3.2 Sediment Yield

The Universal Soil Equation (USLE) was used to estimate sediment yield from disturbed areas. All soil loss from this area was assumed to be delivered to, and deposited in the sedimentation pond.

Erosion rate (A) in tons-per-acre-per-year is determined using the USLE as follows:

$$A = (R) (K) (LS) (CP)$$

Where the variables R, K, LS, and CP are defined as follows:

Variable "R" is the rainfall factor which can be estimated from $R = 27P^{2.2}$; where P is the 2-year, 6-hour precipitation value. P for the Lila Canyon area is 0.75" as shown in Figure 5.4, page 315, Barfield, et.al. 1983. Therefore, the estimated value of "R" for this area is 14.34.

Variable "K" is the soil erodibility factor. For disturbed areas, the "K" value is conservatively estimated to be 0.5. For disturbed runoff, but uncompacted and ungraded areas, "K" is estimated at 0.320. "K" is estimated to be 0.035 for undisturbed areas.

Variable "LS" is the length-slope factor. This figure was determined by applying the slope length and percentage for each sub-drainage area to the chart in Figure 5.15, p. 334, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

Variable "CP" is the control practice factor, which can be divided into a cover and practice factor. Values were determined from Appendix 5A, Barfield, et.al., 1983.

Site	CP Factor	·
Compacted Areas Disturbed/Uncompacted Areas Undisturbed Areas	1.20 0.20 0.15	

The sediment volume is based on a density of 100 pounds per cubic foot of sediment.

SEDIMENT YIELD O	CALCULATIONS -	USLE - Sediment Pond #1
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Drainage	R	K	Acres	Slope Length Feet	Slope (%)	LS	СР	A	Yield
DA-1a	14.34	0.500	0.33	680	22.35	12.50	1.20	107.55	0.0163
DA-1b	14.34	0.500	0.31	420	11.43	3.30	1.20	28.39	0.0040
DA-1c	14.34	0.500	0.20	225	8.89	1.70	1.20	14.63	0.0013
DA-2a	14.34	0.500	0.93	680	23.82	13.00	1.20	111.85	0.0478
DA-2b	14.34	0.500	0.14	350	10.29	2.80	1.20	24.09	0.0015
DA-2c	14.34	0.500	0.10	106	15.10	2.60	1.20	22.37	0.0010
DA-3	14.34	0.500	0.30	170	9.41	1.60	1.20	13.77	0.0019
DA-4a	14.34	0.500	0.14	100	12.00	1.80	1.20	15.49	0.0010
DA-4b	14.34	0.500	0.12	270	10.37	2.40	1.20	20.65	0.0011
DA-4c	14.34	0.500	0.60	580	9.31	2.70	1.20	23.23	0.0064
DA-5a	14.34	0.500	0.07	180	13.33	2.80	1.20	24.09	0.0008
DA-5b	14.34	0.500	0.33	125	11.20	1.80	1.20	15.49	0.0023
DA-5c	14.34	0.500	0.42	570	9.47	3.00	1.20	25.81	0.0050
DA-6a	14.34	0.500	0.28	200	27.00	9.50	1.20	81.74	0.0105
DA-6b	14.34	0.500	3.35	710	9.21	3.20	1.20	27.53	0.0423
DA-6c	14.34	0.500	2.51	690	10.14	3.60	1.20	30.97	0.0357
DA-7	14.34	0.500	2.68	630	4.76	1.25	1.20	10.76	0.0132
DA-8a	14.34	0.500	0.26	284	19.01	4.80	1.20	41.30	0.0049
DA-8b	14.34	0.500	0.76	670	7.80	2.40	1.20	20.65	0.0072
DA-8c	14.34	0.500	0.95	410	10.24	2.80	1.20	24.09	0.0105
DA-9	14.34	0.500	0.05	50	12.00	1.35	1.20	11.62	0.0003
DA-10	14.34	0.500	2.89	700	2.86	0.43	0.01	0.03	0.0000
DA-11	14.34	0.500	0.78	340	4.70	0.85	1.20	7.31	0.0026
DA-13a	14.34	0.500	1.97	470	2.55	0.38	0.01	0.03	0.0000
DA-13b	14.34	0.500	0.49	280	1.43	0.22	1.20	1.89	0.0004
DA-13c	14.34	0.500	0.40	460	4.78	1.05	1.20	9.03	0.0017
UA-2	14.34	0.500	10.01	1500	66.67	75.00	0.15	80.66	0.3707
UA-4	14.34	0.500	14.08	1950	47.76	50.00	0.15	53.78	0.3476
UA-6a	14.34	0.500	1.45	230	34.70	15.00	0.15	16.13	0.0107
UA-6b	14.34	0.500	0.40	90	33.33	9.00	0.15	9.68	0.0018

Total Sediment 1 year (ac.ft.)	. 0.9491
Total Sediment 3 years (ac. ft.)	. 2.8473

^{*} Disturbed Runoff / Uncompacted Area

^{**} Paved Areas

SEDIMENT	YIELD CA	LCULATIONS - USLE -	Sediment Pond #2
		7———————————————	

Drainage	R	K	Acres	Slope Length Feet	Slope (%)	LS	СР	A	Yield
DA-14a	14.34	0.500	0.36	390	8.71	2.25	1.20	19.36	0.0032
DA-14b	14.34	0.500	0.75	540	2.96	0.44	1.20	3.79	0.0013
DA-15a	14.34	0.500	0.38	525	9.52	3.40	1.20	29.25	0.0051
DA-15b	14.34	0.500	0.62	270	4.44	0.62	1.20	5.33	0.0015
DA-16a	14.34	0.500	0.16	370	2.70	0.38	1.20	3.27	0.0002
DA-16b	14.34	0.500	0.09	210	6.19	1.05	1.20	9.03	0.0004
DA-17a	14.34	0.500	0.42	610	3.11	0.50	1.20	4.30	0.0008
DA-17b	14.34	0.500	0.07	100	5.00	0.54	1.20	4.65	0.0002
DA-18a	14.34	0.500	0.07	175	3.43	0.40	1.20	3.44	0.0001
DA-18b	14.34	0.500	0.44	650	3.69	0.65	1.20	5.59	0.0011
Total									0.014

** Paved Areas

3.3 Sediment Pond Volume

The volumes shown in Tables 11a and 11b are from the volumes calculated from the precipitation, runoff and sediment yield for a 10 year-24 hour precipitation event. The volumes were calculated based on the disturbed areas (and contributing undisturbed areas) runoff values, developed using the design parameters described in this section.

TABLE 11a

Table 11a Sediment Pond #1 Design					
1. Use 1.90" for 10 year - 24 hour event.					
2. Runoff Volume - (from Table 5, 10yr/24hr) + (8.73 ac *1.01 ac-in /12 in/ft) =	4.68 ac-ft (1)				
3. Sediment Storage Volume USLE 0.9491 ac.ft./yr. x 3 yrs. =	2.85 ac-ft				
4. Total Required Pond Volume 4.68 + 2.85 =	7.53 ac-ft				
5. Peak Flow (25 yr 6 hr. event)* =	31.44 cfs (2)				
6. Pond Design Volume @ Principle Spillway = (See Table 12a) 8.060 ac-ft					
* Peak Flow values from Table 5, sum of all contributing watersheds plus possible future	flow from UA-1.				

Capacity is 0.73 ac-ft higher than Table 5. This includes flow from undisturbed portion of UA-1 within mine boundary. There is a possibility that the undisturbed area may be needed if the surface facilities were to be expanded.

Peak flow is 7.65 cfs higher that Table 5. This is to allow for flow from UA-5. There is a possibility that UA-5 may be needed if the surface facilities were to be expanded.

TABLE 12a

Table 12a Sediment Pond #1 Stage/Volume Data								
Elevation	Area (sq. ft.)	Volume (ac. ft.)	Acc. Volume (ac. ft.)	Remarks				
5830	22620	0	0.000	Bottom of Pond				
5831	26136	24380	0.56					
5832	29460	27800	1.20					
5833	31340	30400	1.90					
5834	33260	32300	2.64	Sediment Cleanout Level				
5835	35250	34255	3.42	Decant				
5836	37240	36245	4.26					
5837	39320	38280	5.13					
5838	41400	40360	6.06					
5839	43550	42475	7.04					
5840	45700	44625	8.06	Principal Spillway				
5841	47950	46825	9.14	Emergency Spillway				
5842	50200	49075	10.26					
5843	55000	52600	11.47	Top of Embankment				

TABLE 11b

Table 11b Sediment Pond #2 Design						
1. Use 1.90" for 10 year - 24 hour event.						
2. Runoff Volume - (from Table 5, 10yr/24hr) =	0.39 ac-ft.					
3. Sediment Storage Volume USLE 0.014 ac.ft./yr. x 3 yrs. =	0.04 ac-ft					
4. Total Required Pond Volume $0.39 + 0.04 =$	0.43 ac-ft					
5. Peak Flow (25 yr 6 hr. event)* =	2.86 cfs					
6. Pond Design Volume @ Principle Spillway = (See Table 12b) 0.60 ac-ft						
* Peak Flow values from Table 5, sum of all contributing watersheds.						

TABLE 12b

Table 12b Sediment Pond #2 Stage/Volume Data							
Elevation	Area (sq. ft.)	Volume (sq. ft.)	Acc. Volume (ac. ft.)	Remarks			
5838	3560	0	0.00	Bottom of Pond			
5838.4		1740	0.04	Sediment Cleanout Level			
5838.6		2610	0.06	Decant			
5839	4205	3882	0.09				
5840	4850	4527	0.19				
5841	5565	5207	0.31				
5842	6280	5922	0.45	Principal Spillway			
5843	7055	6667	0.60	Emergency Spillway			
5844	7830	7442	0.77	Top of Embankment			

TABLE 13a

Table 13a Sediment Pond #1 Stage/Discharge Data				
Head (ft.)	Q (cfs) Weir Controlled	Q (cfs) Orfice Controlled	Q (cfs) Pipe Flow Controlled	
0.0	_	-	-	
0.2	2.53	15.22	95.68	
0.4	7.15	21.53	96.23	
0.6	13.14	26.36	96.77	
0.8	20.23	30.44	97.31	
1.0	28.27	34.04	97.85	
1.2	37.17	37.28	98.38	
1.4	46.84	40.27	98.91	
1.6	57.22	43.05	98.91	
1.8	68.28	45.66	99.44	
2.0	79.97	48.13	99.97	

Note: 1-25 year -6 hour flow = 31.44 cfs.

Weir Controlled

 $Q = CLH^{1.5}$; where: C = 3.0, L = Circumference of Riser = 9.4248', <math>R = 1.5'

Orfice Controlled

 $\overline{Q = C'a (2gH)^{0.5}}$; where: C= 0.6, a= Area of Riser = 7.0686 ft², R=1.5', g= 32.2 ft/sec²

Pipe Flow Controlled

; where

 $a = Area of Pipe = 7.07 ft^2, R = 1.5'$

 $Q = \underline{a} (2gH')^{0.5}$ $(1+Ke+Kb+KcL)^{0.5}$

H' = Head = H + 14.5 (Riser) + 0.35 (Slope) + 0.6*4 (barrel height)

Ke = 1.0

Kb = 0.5

Kc = 0.043

L = 70'

²⁻ Flow will be weir controlled at a head of 1.07' over riser inlet.

TABLE 13b

Table 13b Sediment Pond #2 Stage/Discharge Data				
Head (ft.)	Q (cfs) Q (cfs) Weir Controlled Orfice Controll		Q (cfs) Pipe Flow Controlled	
0.0	-	-	-	
0.2	0.84	1.69	5.81	
0.4	2.38	2.39	5.88	
0.6	4.38	2.93	5.95	
0.8	6.74	3.38	6.02	
1.0	9.42	3.78	6.09	
1.2	12.39	4.14	6.16	
1.4	15.61	4.47	6.22	
1.6	19.07	4.78	6.29	
1.8	22.76	5.07	6.36	
2.0	26.66	5.35	6.42	

Note: 1-25 year - 6 hour flow = 2.86 cfs.

2- Flow will be orifice controlled at a head of 0.57' over riser inlet.

Weir Controlled

Q = CLH^{1.5}; where: C= 3.0, L= Circumference of Riser =3.14', R=0.5'

Orfice Controlled

 $\overline{Q = C'a (2gH)^{0.5}}$; where: C= 0.6, a= Area of Riser = 0.79 ft², R=0.5', g= 32.2 ft/sec²

Pipe Flow Controlled

 $Q = a (2gH')^{0.5}$

; where

 $a = Area of Pipe = 0.79 ft^2, R = 0.5'$

(1+Ke+Kb+KcL)0.5

H' = Head = H + 6.0 (Riser) + 0.8 (Slope) + 0.6*2 (barrel height)

Ke = 1.0 Kb = 0.5Kc = 0.043

L = 160'

3.4 Sediment Pond Summary

- a) The sedimentation ponds have been designed to contain the disturbed area (and contributing undisturbed area) runoff from a 10 year-24 hour precipitation event, along with 3 years of sediment storage capacity. Runoff to the ponds will be directed by various ditches and culverts as described in the plan.
- b) The required volume for Sediment Pond #1 is calculated at 7.53 acre feet, including 3 years of sediment storage. The proposed sediment pond size will have a volume of approximately 8.06 acre feet (at the principal spillway), which is more than adequate. The required volume for Sediment Pond #2 is calculated at 0.43 acre feet, including 3 years of sediment storage. The proposed sediment pond size will have a volume of approximately 0.45 acre feet (at the principal spillway), which is more than adequate.
- c) The ponds will meet a theoretical detention time of 24 hours. Both are equipped with a decant, a culvert principal spillway and a culvert emergency spillway. Any discharge from the ponds will be in accordance with the approved UPDES Permit.
- d) The pond inlets will be protected from erosion, and the spillways will discharge into the natural drainages in a controlled manner.
- e) The ponds are temporary, and will be removed upon final reclamation of the property.
- f) The ponds will be constructed according to the regulations and under supervision of a Registered, Professional Engineer.

DESIGN OF DRAINAGE CONTROL STRUCTURES FOR RECLAMATION

Reclamation Hydrology:

- 4.1 General
- 4.2 Reclamation Area Drainage Control

Tables:

Table 14	Final Reclamation - Drainage Areas Contributing to Structures
Table 15	Final Reclamation - Drainage Structure Flow Summary
Table 16	Final Reclamation - Reclamation Structure Design Parameters
Table 17	Final Reclamation - Reclamation Structure Flow Calculations

Reclamation Hydrology

4.1 General

Upon completion of operations at the Lila Canyon Minesite, the portals will be sealed and backfilled and all structures will be removed except for the sediment ponds, bypass culvert UC-1, reclamation ditches and temporary sediment controls such as silt fences or straw bales.

Any refuse or mine development waste previously deposited under the approved plan will also be left in place. Concrete will be buried beneath at least 2' of non-toxic, non-acid material. Any potentially toxic or acid-forming material buried on site will be covered with a minimum of 4' of material.

The sediment ponds, and all remaining drainage controls will be removed upon completion of Phase II Bond Release.

4.2 Reclamation Area Drainage Control

During the initial phase of reclamation, all drainage controls will be removed with the exception of the two sediment ponds, bypass culvert UC-1, reclaimed ditches RD-1 and RD-2 and temporary sediment controls such as straw bales or silt fences installed in the undisturbed drainages.

As undisturbed drainage culverts are removed, a minimum of two straw bale or silt fence barriers will be installed downstream of each location for sediment control purposes.

Disturbed areas will be regraded and reclaimed ditches RD-1 and RD-2 will be installed to collect the runoff from the site area and direct it to the outlet structures (see Plate 7-7).

When the vegetation and sediment contribution levels meet requirements for Phase II Bond Release, a series of at least three straw bale or silt fence barriers will be placed downstream of the sediment pond outlets. All upstream sediment controls will be removed. Reclaimed ditches RD-1 and RD-2 will also be removed, regraded and reseeded. Culvert UC-1 will be cut off at the location of the principal pond spillway.

The portion of culvert UC-1 remaining beneath the road will be left as a permanent drainage control. The culvert will be equipped with an inlet section and rip-rapped headwall. The culvert is adequately sized to safely pass runoff from a 100 year - 6 hour event, as shown in Table 10. To ensure that state of the art technology is incorporated, the final reclamation

plans for the sedimentation pond areas will be submitted prior to commencement of final reclamation of this area.

The remainder of culvert UC-1 will be removed, and the natural channel restored through the sediment pond #1 area. The sediment pond structures will also be removed, the pond areas regraded as necessary and reseeded. The pond #1 embankment will remain as a permanent feature, since the existing (and proposed future) road through the area passes over the embankment.

Following the successful establishment of vegetation and when effluent standards are met, the sediment ponds will be removed. The same methodologies relative to recontouring, top soil application and seeding will be utilized in grading and revegetating the pond areas as outlined in Chapters 2, 5, and Appendix 5-8.

The pond embankment will be narrowed to facilitate the even character of the Lila Canyon Road. The 48 inch bypass culvert (UC-1) will be removed to within six feet of the road embankment. A newly formed channel will be constructed at an approximate four percent grade to intercept the inlet of the culvert at its intersection of the road. The road embankment and associated new channel will be armored by the Operator with an underlayment of filter gravel, with D_{50} -30 inch rip-rap. The new area of disturbance including the newly formed channel will have top soil spread in and around the rip-rap. The Operator will use the same seeding and mulching methods described in Appendix 5-8 will be used on this area as well. See Figures 4 and 7 for a detailed design.

TABLE 14

Table 14 Final Reclamation Drainage Areas Contributing to Structures			
Channel Contributing Watershed/Structure			
RD-1	RW-1		
RD-2	RW-2		
UC-1	UA-1, UA-4, RD-1		

TABLE 15

Table 15 Final Reclamation Drainage Structure Flow Summary			
Channel	*100/6 Flow (cfs)		
RD-1	13.26		
RD-2	10.89		
UC-1	**72.62		

^{*} CN = 83.

^{**} Combined flow for watersheds UA-1, UA-4, and RW-2.

TABLE 16

Table 16 Final Reclamation Reclamation Structure Design Parameters					
Channel	Bottom Width (ft.)	Side Slope H:V	Slope %	Reclaimed Depth (ft.)	Manning's No.
RD-1	3	2:1	5.00	1.5	0.035
RD-2	3	2:1	10.00	1.5	0.035
UC-1	48" Diam.	-	5.56	48" Diam.	0.025

TABLE 17

Table 17 Final Reclamation Reclamation Structure Flow Calculations				
Channel	RD-1	RD-2	UC-1	
100 year - 6 hour event (in.)	1.90	1.90	1.90	
Peak Flow (cfs)	13.26	10.89	72.62	
Velocity (fps)	5.44	6.52	13.34	
Required Area (ft. ²)	2.44	1.67	5.44	
Flow Depth (ft.)	0.58	0.43	1.79	

Alternate Sediment Control for Fan Site and Topsoil Storage Area

Sediment Control at the fan, slope below water treatment area, and topsoil storage area sites will be accomplished with a combination of one or more of the following: berms, silt fences, and straw bales.

The topsoil collected from the fan and topsoil storage area sites will be located downslope from the sites and will be used in the construction of the berm. The berm will be constructed a minimum of two feet high and have 2:1 side slopes. The berm will control the flow from a 10 year-24 hour precipitation event. Silt fence will be selectively placed to help control run-off. The berm will be stabilized with vegetation to prevent erosion. As much as practical, the vegetation techniques used on the main topsoil pile will be utilized on the fan topsoil berm.

The outside of the berm will be protected with a silt fence or gravel. The gravel, if used, would help augment the revegetation. Construction details of the silt fence/filter fence are shown if Figure 8.

The outslope of the portal access road and the outslope of the water treatment pad will have a silt fence located along the disturbed area boundary to treat the runoff from the slope. While some portions of this area will be disturbed as a result of the fill material placed for the pad and road construction, the major portion of this area is expected to remain undisturbed. As an added protection, the portions of the area that are disturbed by the fill placement will be covered with a erosion control mat to minimize the erosion from this slope and that area seeded to aid in the establishment of a vegetative cover.

Due to lack of final engineering details, the exact location of the berms, silt fences, and subsequent erosion techniques will be determined in field with the approval of UDOGM. The final determination will be made prior to the start of topsoil removal.

Run-off Calculations

Fan Site

Acreage:

0.716 acres

Design Storm:10 year/24 hour:

1.90"

1.111

CN: S: 90

 $Q = (P-0.25S)^2$

P+0.8S

Total run-off = 0.06 acre feet

= 1.01" of runoff

Topsoil Storage Area

Acreage: 2.61 acres
Design Storm:10 year/24 hour: 1.90"

CN: 90
S: 1.111

 $Q = (P-0.25S)^2$ P+0.8S = 1.01" of runoff

Total run-off = 0.22 acre feet

Water Treatment Area

Acreage: 0.37 acres

Design Storm:10 year/24 hour: 1.90"
CN: 90
S: 1.111

 $Q = (P-0.2S)^2$ P+0.8S = 1.01" of runoff

Total run-off = 0.03 acre feet

Lila Canyon Mine Watershed Calculations

Lila Canyon Mine Ditch Calculations

Lila Canyon Mine Culvert Calculations Project Title = LILA CANYON UA-1 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 75.0

Area

= 248.4 acres

Hydraulic length = 5200.00 feet

Elevation change = 1480.0 feet.

Concentration time = 0.27 hours

Unit hydrograph type = Forested

-- Total Area

= 248.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 7.02 cfs

Discharge volume = 2.09 acre ft

Project Title = LILA CANYON UA-1 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 75.0

Area = 248.4 acres

Hydraulic length = 5200.00 feet

Elevation change = 1480.0 feet.

Concentration time = 0.27 hours

Unit hydrograph type = Forested

-- Total Area = 248.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 10.31 cfs

Discharge volume = 3.45 acre ft

Project Title = LILA CANYON UA-1 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 75.0

Area = 248.4 acres

Hydraulic length = 5200.00 feet

Elevation change = 1480.0 feet.

Concentration time = 0.27 hours

Unit hydrograph type = Forested

-- Total Area = 248.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 20.48 cfs

Discharge volume = 6.90 acre ft

Project Title = LILA CANYON UA-1 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 75.0

Area

= 248.4 acres

Hydraulic length = 1500.00 feet

Elevation change = 1000.0 feet.

Concentration time = 0.27 hours

Unit hydrograph type = Forested

-- Total Area = 248.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type

= SCS Type 2 storm, 24 hour design storm

Peak Discharge

= 25.53 cfs

Discharge volume = 6.90 acre ft

Project Title = LILA CANYON UA-2 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 10.0 acres

Hydraulic length = 1500.00 feet

Elevation change = 1000.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 10.0 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 2.11 cfs

Discharge volume = 0.23 acre ft

Project Title = LILA CANYON UA-2 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 10.0 acres

Hydraulic length = 1500.00 feet

Elevation change = 1000.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 10.0 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 3.11 cfs

Discharge volume = 0.32 acre ft

Project Title = LILA CANYON UA-2 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 83.0

Area

= 10.0 acres

Hydraulic length = 1500.00 feet

Elevation change = 1000.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area

= 10.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 5.35 cfs

Discharge volume = 0.52 acre ft

Project Title = LILA CANYON UA-2 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 10.0 acres

Hydraulic length = 1500.00 feet

Elevation change = 1000.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 10.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 6.11 cfs

Discharge volume = 0.52 acre ft

Project Title = LILA CANYON UA-4 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 14.1 acres

Hydraulic length = 1950.00 feet

Elevation change = 595.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 14.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 3.14 cfs

Discharge volume = 0.32 acre ft

Project Title = LILA CANYON UA-4 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 14.1 acres

Hydraulic length = 1950.00 feet

Elevation change = 595.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 14.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 4.65 cfs

Discharge volume = 0.44 acre ft

Project Title = LILA CANYON UA-4 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 14.1 acres

Hydraulic length = 1950.00 feet

Elevation change = 595.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 14.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 8.04 cfs

Discharge volume = 0.74 acre ft

Project Title = LILA CANYON UA-4 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 83.0

Area

= 14.1 acres

Hydraulic length = 1950.00 feet

Elevation change = 595.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area

= 14.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type

= SCS Type 2 storm, 24 hour storm

Peak Discharge

= 9.20 cfs

Discharge volume = 0.74 acre ft

Project Title = LILA CANYON UA-6a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: . Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 1.5 acres

Hydraulic length = 230.00 feet

Elevation change = 80.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.5 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.47 cfs

Discharge volume = 0.06 acre ft

Project Title = LILA CANYON UA-6a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 90.0

Area

= 1.5 acres

Hydraulic length = 230.00 feet

Elevation change = 80.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area

= 1.5 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 0.60 cfs

Project Title = LILA CANYON UA-6a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 1.5 acres

Hydraulic length = 230.00 feet

Elevation change = 80.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.88 cfs

Project Title = LILA CANYON UA-6a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 1.5 acres

Hydraulic length = 230.00 feet

Elevation change = 80.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.95 cfs

Project Title = LILA CANYON UA-6b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 90.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.10 cfs

Project Title = LILA CANYON UA-6b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 90.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.13 cfs

Project Title = LILA CANYON UA-6b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 90.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.19 cfs

Project Title = LILA CANYON UA-6b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 90.0

Area

= 0.4 acres

Hydraulic length = 90.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area

0.4 acres

-- Storm data

Total precipitation =

1.9 inches

Storm type

= SCS Type 2 storm, 24 hour storm

Peak Discharge

= 0.21 cfs

= LILA CANYON UA - 7 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.6 acres

Hydraulic length = 195.0 Feet

Elevation change = 25.0 feet

Concentration time = 0.02 hours

Concentration time type = SCS Upland Curves

Unit Hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm Data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.21 cfs

= LILA CANYON UA - 7 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:Null

-- Watershed data for watershed # 1

Curve number

= 90.0

Area

0.6 acres

Hydraulic length

= 195.0 Feet

Elevation change

= 25.0 feet

Concentration time

= 0.02 hours

Concentration time type

SCS Upland Curves

Unit Hydrograph type =

Disturbed

-- Total Area

=

0.6 acres

-- Storm Data

Total precipitation

1.5 inches

Storm type

=

SCS 6 hour design storm

Peak Discharge

=

0.27 cfs

Discharge volume

0.03 acre ft

= LILA CANYON UA - 7 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:Null

-- Watershed data for watershed # 1

Curve number

90.0

=

Area

0.6 acres

Hydraulic length

195.0 Feet

Elevation change

= 25.0 feet

Concentration time

0.02 hours

Concentration time type

= SCS Upland Curves

Unit Hydrograph type =

Disturbed

-- Total Area

0.6 acres

-- Storm Data

Total precipitation

1.9 inches

Storm type

SCS 6 hour design storm

Peak Discharge

0.40 cfs

Discharge volume

0.05 acre ft

= LILA CANYON UA - 7 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:Null

-- Watershed data for watershed # 1

Curve number

90.0

=

Area

0.6 acres

Hydraulic length

195.0 Feet

Elevation change

= 25.0 feet

Concentration time

0.02 hours

Concentration time type

SCS Upland Curves

Unit Hydrograph type =

Disturbed

-- Total Area

0.6 acres

-- Storm Data

Total precipitation

1.9 inches

Storm type

=

SCS Type 2 storm, 24 hour storm

Peak Discharge

= 0.43 cfs

Discharge volume

0.03 acre ft

Project Title = LILA CANYON DA-1a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 680.00 feet

Elevation change = 152.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.22 cfs

Project Title = LILA CANYON DA-1a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 680.00 feet

Elevation change = 152.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.26 cfs

Project Title = LILA CANYON DA-1a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 95.0

Area

= 0.3 acres

Hydraulic length = 680.00 feet

Elevation change = 152.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area

= 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 0.35 cfs

Project Title = LILA CANYON DA-1a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 680.00 feet

Elevation change = 152.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.37 cfs

Project Title = LILA CANYON DA-1b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 420.00 feet

Elevation change = 48.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.20 cfs

Project Title = LILA CANYON DA-1b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 420.00 feet

Elevation change = 48.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.24 cfs

Project Title = LILA CANYON DA-1b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.3 acres

Hydraulic length = 420.00 feet

Elevation change = 48.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.32 cfs

Project Title = LILA CANYON DA-1b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 95.0

Area

= 0.3 acres

Hydraulic length = 420.00 feet

Elevation change = 48.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.33 cfs

Project Title = LILA CANYON DA-1c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 225.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.11 cfs

Project Title = LILA CANYON DA-1c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 225.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.14 cfs

Project Title = LILA CANYON DA-1c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 225.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.19 cfs

Project Title = LILA CANYON DA-1c (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 225.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.19 cfs

Project Title = LILA CANYON DA-2a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.9 acres

Hydraulic length = 680.00 feet

Elevation change = 162.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.9 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.61 cfs

Project Title = LILA CANYON DA-2a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.9 acres

Hydraulic length = 680.00 feet

Elevation change = 162.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.9 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.73 cfs

Project Title = LILA CANYON DA-2a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.9 acres

Hydraulic length = 680.00 feet

Elevation change = 162.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.9 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.98 cfs

Project Title = LILA CANYON DA-2a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.9 acres

Hydraulic length = 680.00 feet

Elevation change = 162.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.9 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 1.03 cfs

Project Title = LILA CANYON DA-2b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 350.00 feet

Elevation change = 36.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.09 cfs

Project Title = LILA CANYON DA-2b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 350.00 feet

Elevation change = 36.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.10 cfs

Project Title = LILA CANYON DA-2b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 350.00 feet

Elevation change = 36.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.14 cfs

Project Title = LILA CANYON DA-2b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 95.0

Area

0.1 acres

Hydraulic length

= 350.00 feet

Elevation change = 36.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type

= SCS Type 2 storm, 24 hour storm

Peak Discharge

= 0.15 cfs

Project Title = LILA CANYON DA-2c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 106.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.04 cfs

Project Title = LILA CANYON DA-2c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 106.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.05 cfs

Project Title = LILA CANYON DA-2c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 106.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.07 cfs

Project Title = LILA CANYON DA-2c (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 106.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.08 cfs

Project Title = LILA CANYON DA-3 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 170.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.11 cfs

Project Title = LILA CANYON DA-3 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 170.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.14 cfs

Project Title = LILA CANYON DA-3 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 170.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.20 cfs

Project Title = LILA CANYON DA-3 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 170.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.21 cfs

Project Title = LILA CANYON DA-4a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.06 cfs

Project Title = LILA CANYON DA-4a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.08 cfs

Project Title = LILA CANYON DA-4a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.10 cfs

Project Title = LILA CANYON DA-4a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.11 cfs

Project Title = LILA CANYON DA-4b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 270.00 feet

Elevation change = 28.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.07 cfs

Project Title = LILA CANYON DA-4b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 270.00 feet

Elevation change = 28.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.08 cfs

Project Title = LILA CANYON DA-4b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 270.00 feet

Elevation change = 28.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.11 cfs

Project Title = LILA CANYON DA-4b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 270.00 feet

Elevation change = 28.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.12 cfs

Project Title = LILA CANYON DA-4c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 580.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.42 cfs

Project Title = LILA CANYON DA-4c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 580.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.51 cfs

Project Title = LILA CANYON DA-4c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 580.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.68 cfs

Project Title = LILA CANYON DA-4c (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 580.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.71 cfs

Project Title = LILA CANYON DA-5a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 180.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.05 cfs

Project Title = LILA CANYON DA-5a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 180.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.06 cfs

Project Title = LILA CANYON DA-5a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 180.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.08 cfs

Project Title = LILA CANYON DA-5a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 180.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.09 cfs

Project Title = LILA CANYON DA-5b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 125.00 feet

Elevation change = 14.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.11 cfs

Project Title = LILA CANYON DA-5b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 125.00 feet

Elevation change = 14.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.14 cfs

Project Title = LILA CANYON DA-5b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 125.00 feet

Elevation change = 14.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.20 cfs

Project Title = LILA CANYON DA-5b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 125.00 feet

Elevation change = 14.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.21 cfs

Project Title = LILA CANYON DA-5c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 570.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.29 cfs

Project Title = LILA CANYON DA-5c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 570.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.35 cfs

Project Title = LILA CANYON DA-5c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 570.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.47 cfs

Project Title = LILA CANYON DA-5c (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 570.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.49 cfs

Project Title = Lila Canyon DA-6a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 200.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.09 cfs

Project Title = Lila Canyon DA-6a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 200.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.12 cfs

Project Title = Lila Canyon DA-6a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 90.0

Area

0.3 acres

Hydraulic length

= 200.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 0.17 cfs

Project Title = Lila Canyon DA-6a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 200.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.18 cfs

Project Title = Lila Canyon DA-6b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 90.0

Area

= 3.3 acres

Hydraulic length

= 760.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 1.60 cfs

Project Title

= Lila Canyon DA-6b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 90.0

Area

3.3 acres

Hydraulic length

= 760.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area

= 3.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 2.06 cfs

Project Title = Lila Canyon DA-6b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 3.3 acres

Hydraulic length = 760.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 3.03 cfs

Project Title = Lila Canyon DA-6b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 3.3 acres

Hydraulic length = 760.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 3.27 cfs

Project Title = Lila Canyon DA-6c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 2.5 acres

Hydraulic length = 690.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.5 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.18 cfs

Project Title = Lila Canyon DA-6c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 2.5 acres

Hydraulic length = 690.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.5 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.52 cfs

Project Title = Lila Canyon DA-6c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 2.5 acres

Hydraulic length = 690.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 2.23 cfs

Project Title = Lila Canyon DA-6c (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 2.5 acres

Hydraulic length = 690.00 feet

Elevation change = 70.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 2.40 cfs

Project Title = Lila Canyon DA-7 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.7 acres

Hydraulic length = 630.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.7 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.98 cfs

Project Title = Lila Canyon DA-7 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.7 acres

Hydraulic length = 630.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.7 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 2.39 cfs

Project Title = Lila Canyon DA-7 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.7 acres

Hydraulic length = 630.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.7 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 3.22 cfs

Project Title = Lila Canyon DA-7 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.7 acres

Hydraulic length = 630.00 feet

Elevation change = 30.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.7 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 3.36 cfs

= Lila Canyon DA-8a (10/6) Project Title

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 90.0

Area

0.3 acres

Hydraulic length

= 284.00 feet

Elevation change

= 54.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 0.10 cfs

Project Title = Lila Canyon DA-8a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 284.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.12 cfs

Project Title = Lila Canyon DA-8a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 284.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.18 cfs

Project Title = Lila Canyon DA-8a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.3 acres

Hydraulic length = 284.00 feet

Elevation change = 54.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.3 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.19 cfs

Project Title = Lila Canyon DA-8b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.8 acres

Hydraulic length = 670.00 feet

Elevation change = 52.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.36 cfs

Project Title = Lila Canyon DA-8b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.8 acres

Hydraulic length = 670.00 feet

Elevation change = 52.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.47 cfs

Project Title = Lila Canyon DA-8b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.8 acres

Hydraulic length = 670.00 feet

Elevation change = 52.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.68 cfs

Project Title = Lila Canyon DA-8b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 90.0

Area

0.8 acres

Hydraulic length

= 670.00 feet

Elevation change = 52.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type

= SCS Type 2 storm, 24 hour storm

Peak Discharge

= 0.74 cfs

Project Title = Lila Canyon DA-8c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 90.0

Area

1.0 acres

Hydraulic length

= 410.00 feet

Elevation change = 42.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.0 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 0.40 cfs

Project Title = Lila Canyon DA-8c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 1.0 acres

Hydraulic length = 410.00 feet

Elevation change = 42.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.0 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.52 cfs

Project Title = Lila Canyon DA-8c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 1.0 acres

Hydraulic length = 410.00 feet

Elevation change = 42.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.76 cfs

Project Title = Lila Canyon DA-8c (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 90.0

Area

= 1.0 acres

Hydraulic length

= 410.00 feet

Elevation change = 42.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type

= SCS Type 2 storm, 24 hour storm

Peak Discharge

= 0.81 cfs

Project Title = Lila Canyon DA-9 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 95.0

Area

0.1 acres

Hydraulic length = 50.00 feet

Elevation change =

6.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 0.04 cfs

Project Title = Lila Canyon DA-9 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 95.0

Area

0.1 acres

Hydraulic length = 50.00 feet

Elevation change =

6.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 0.05 cfs

Project Title = Lila Canyon DA-9 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 50.00 feet

Elevation change = 6.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.06 cfs

Project Title = Lila Canyon DA-9 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 50.00 feet

Elevation change = 6.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.07 cfs

= Lila Canyon DA-10 (10/6) Project Title

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 95.0

Area

= 2.9 acres

Hydraulic length

= 700.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.08 hours

Unit hydrograph type = Disturbed

-- Total Area

= 2.9 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 2.19 cfs

Project Title = Lila Canyon DA-10 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.9 acres

Hydraulic length = 700.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.08 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.9 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 2.65 cfs

Project Title = Lila Canyon DA-10 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.9 acres

Hydraulic length = 700.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.08 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.9 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 3.57 cfs

Project Title = Lila Canyon DA-10 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.9 acres

Hydraulic length = 700.00 feet

Elevation change = 20.0 feet.

Concentration time = 0.08 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.9 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 3.73 cfs

Project Title = Lila Canyon DA-11 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 340.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.52 cfs

Project Title = Lila Canyon DA-11 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 340.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.63 cfs

Project Title = Lila Canyon DA-11 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 340.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.85 cfs

Project Title = Lila Canyon DA-11 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 340.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.89 cfs

Project Title = Lila Canyon DA-13a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.0 acres

Hydraulic length = 470.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.0 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.46 cfs

Project Title = Lila Canyon DA-13a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.0 acres

Hydraulic length = 470.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.0 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.76 cfs

Project Title = Lila Canyon DA-13a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.0 acres

Hydraulic length = 470.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 2.37 cfs

Project Title = Lila Canyon DA-13a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 2.0 acres

Hydraulic length = 470.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 2.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 2.47 cfs

Project Title = Lila Canyon DA-13b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.5 acres

Hydraulic length = 280.00 feet

Elevation change = 4.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.5 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.23 cfs

Project Title = Lila Canyon DA-13b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.5 acres

Hydraulic length = 280.00 feet

Elevation change = 4.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.5 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.30 cfs

Project Title = Lila Canyon DA-13b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.5 acres

Hydraulic length = 280.00 feet

Elevation change = 4.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.44 cfs

Project Title = Lila Canyon DA-13b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 90.0

Area

= 0.5 acres

Hydraulic length = 280.00 feet

Elevation change = 4.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type

= SCS Type 2 storm, 24 hour storm

Peak Discharge

= 0.47 cfs

Project Title = Lila Canyon DA-13c (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 460.00 feet

Elevation change = 22.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.19 cfs

Project Title = Lila Canyon DA-13c (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 460.00 feet

Elevation change = 22.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.24 cfs

Project Title = Lila Canyon DA-13c (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 90.0

Area = 0.4 acres

Hydraulic length = 460.00 feet

Elevation change = 22.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.35 cfs

= Lila Canyon DA-13c (10/24) Project Title

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 90.0

Area

= 0.4 acres

Hydraulic length

= 460.00 feet

Elevation change = 22.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area

= 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type

= SCS Type 2 storm, 24 hour storm

Peak Discharge

= 0.38 cfs

Project Title = Lila Canyon DA-14a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 390.00 feet

Elevation change = 34.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.23 cfs

Project Title = Lila Canyon DA-14a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 390.00 feet

Elevation change = 34.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.28 cfs

Project Title = Lila Canyon DA-14a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 390.00 feet

Elevation change = 34.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.38 cfs

Project Title = Lila Canyon DA-14a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 390.00 feet

Elevation change = 34.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.39 cfs

Project Title = Lila Canyon DA-14b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 540.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.56 cfs

Project Title = Lila Canyon DA-14b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 540.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.67 cfs

Project Title = Lila Canyon DA-14b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 540.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.91 cfs

Project Title = Lila Canyon DA-14b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.8 acres

Hydraulic length = 540.00 feet

Elevation change = 16.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.8 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.95 cfs

Project Title = Lila Canyon DA-15a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 525.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.26 cfs

Project Title = Lila Canyon DA-15a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 525.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.31 cfs

Project Title = Lila Canyon DA-15a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 525.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.42 cfs

Project Title = Lila Canyon DA-15a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 525.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.04 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.44 cfs

Project Title = Lila Canyon DA-15b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 270.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.40 cfs

Project Title = Lila Canyon DA-15b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 270.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.48 cfs

Project Title = Lila Canyon DA-15b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 270.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.64 cfs

Project Title = Lila Canyon DA-15b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.6 acres

Hydraulic length = 270.00 feet

Elevation change = 12.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.6 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.67 cfs

Project Title = Lila Canyon DA-16a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 370.00 feet

Elevation change = 10.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.11 cfs

Project Title = Lila Canyon DA-16a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 95.0

Area

= 0.2 acres

Hydraulic length = 370.00 feet

Elevation change = 10.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area

= 0.2 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 0.14 cfs

Project Title = Lila Canyon DA-16a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.2 acres

Hydraulic length = 370.00 feet

Elevation change = 10.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.19 cfs

Project Title = Lila Canyon DA-16a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 95.0

Area

= 0.2 acres

Hydraulic length = 370.00 feet

Elevation change = 10.0 feet.

Concentration time = 0.05 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.2 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type

= SCS Type 2 storm, 24 hour storm

Peak Discharge

= 0.19 cfs

Project Title = Lila Canyon DA-16b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 210.00 feet

Elevation change = 13.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.06 cfs

Project Title = Lila Canyon DA-16b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 210.00 feet

Elevation change = 13.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.07 cfs

Project Title = Lila Canyon DA-16b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 210.00 feet

Elevation change = 13.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.10 cfs

Project Title = Lila Canyon DA-16b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 210.00 feet

Elevation change = 13.0 feet.

Concentration time = 0.02 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.10 cfs

Project Title = Lila Canyon DA-17a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 610.00 feet

Elevation change = 19.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.31 cfs

Project Title = Lila Canyon DA-17a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 610.00 feet

Elevation change = 19.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.38 cfs

Project Title = Lila Canyon DA-17a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 610.00 feet

Elevation change = 19.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.51 cfs

Project Title = Lila Canyon DA-17a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 610.00 feet

Elevation change = 19.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.53 cfs

Project Title = Lila Canyon DA-17b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 5.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.05 cfs

Project Title = Lila Canyon DA-17b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 5.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.06 cfs

Project Title

= Lila Canyon DA-17b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 95.0

Area

= 0.1 acres

Hydraulic length = 100.00 feet

Elevation change =

5.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 0.08 cfs

Project Title = Lila Canyon DA-17b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 100.00 feet

Elevation change = 5.0 feet.

Concentration time = 0.01 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.09 cfs

Project Title = Lila Canyon DA-18a (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 95.0

Area

0.1 acres

Hydraulic length = 175.00 feet

Elevation change =

6.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 0.06 cfs

Discharge volume

= 0.01 acre ft

Project Title = Lila Canyon DA-18a (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 175.00 feet

Elevation change = 6.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.07 cfs

Project Title = Lila Canyon DA-18a (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 175.00 feet

Elevation change = 6.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.10 cfs

Project Title = Lila Canyon DA-18a (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.1 acres

Hydraulic length = 175.00 feet

Elevation change = 6.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.10 cfs

Project Title = Lila Canyon DA-18b (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 650.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.33 cfs

Project Title = Lila Canyon DA-18b (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 650.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.40 cfs

Project Title = Lila Canyon DA-18b (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 95.0

Area

= 0.4 acres

Hydraulic length = 650.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area

= 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 0.53 cfs

Project Title = Lila Canyon DA-18b (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 0.4 acres

Hydraulic length = 650.00 feet

Elevation change = 24.0 feet.

Concentration time = 0.07 hours

Unit hydrograph type = Disturbed

-- Total Area = 0.4 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 0.56 cfs

Project Title = Lila Canyon TS-1 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 3.0 acres

Hydraulic length = 660.00 feet

Elevation change = 38.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.0 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.65 cfs

Project Title = Lila Canyon TS-1 (25/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 3.0 acres

Hydraulic length = 660.00 feet

Elevation change = 38.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.0 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 0.96 cfs

Project Title = Lila Canyon TS-1 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 3.0 acres

Hydraulic length = 660.00 feet

Elevation change = 38.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.66 cfs

Project Title = Lila Canyon TS-1 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 3.0 acres

Hydraulic length = 660.00 feet

Elevation change = 38.0 feet.

Concentration time = 0.06 hours

Unit hydrograph type = Disturbed

-- Total Area = 3.0 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 1.90 cfs

Project Title = Lila Canyon Pond 1 (10/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 95.0

Area

= 1.9 acres

Hydraulic length = 380.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area 1.9 acres

-- Storm data

Total precipitation = 1.3 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 1.18 cfs

= Lila Canyon Pond 1 (25/6) Project Title

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number

= 95.0

Area

= 1.9 acres

Hydraulic length = 380.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area

1.9 acres

-- Storm data

Total precipitation = 1.5 inches

Storm type

= SCS 6 hour design storm

Peak Discharge

= 1.42 cfs

Project Title = Lila Canyon Pond 1 (100/6)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 1.9 acres

Hydraulic length = 380.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.9 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 1.91 cfs

Project Title = Lila Canyon Pond 1 (10/24)

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 95.0

Area = 1.9 acres

Hydraulic length = 380.00 feet

Elevation change = 50.0 feet.

Concentration time = 0.03 hours

Unit hydrograph type = Disturbed

-- Total Area = 1.9 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS Type 2 storm, 24 hour storm

Peak Discharge = 1.99 cfs

Project Title = Lila Site - RW-1 - 100/6

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type:

Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 23.5 acres

Hydraulic length = 1970.00 feet

Elevation change = 325.0 feet.

Concentration time = 0.09 hours

Unit hydrograph type = Disturbed

-- Total Area = 23.5 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 13.26 cfs

Project Title = Lila Site - RW-2 - 100/6

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 19.1 acres

Hydraulic length = 2430.00 feet

Elevation change = 655.0 feet.

Concentration time = 0.09 hours

Unit hydrograph type = Disturbed

-- Total Area = 19.1 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 10.89 cfs

Project Title = Lila Site - UC-1 - 100/6

WATERSHED HYDROGRAPH

Inflow into structure # 1

Structure type: Null

-- Watershed data for watershed # 1

Curve number = 83.0

Area = 281.6 acres

Hydraulic length = 5200.00 feet

Elevation change = 1480.0 feet.

Concentration time = 0.15 hours

Unit hydrograph type = Forested

-- Total Area = 281.6 acres

-- Storm data

Total precipitation = 1.9 inches

Storm type = SCS 6 hour design storm

Peak Discharge = 72.62 cfs

Discharge volume = 14.73 acre ft

Lila Canyon Mine Ditch Calculations

Project Description	on
Worksheet	
	DD-1a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.114 ft/ft
	200
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	
Discharge	0.22 cfs
Results	
Depth	0.20 ft
Flow Area	0.08 ft ²
Wetted	0.88 ft
Perimeter	
Top Width	0.79 ft
Critical Depth	0.24 ft
Critical Slope	0.042153 ft/ft
Velocity	2.84 ft/s
Velocity	0.13 ft
Head	
Specific	0.32 ft
Energy	
Froude	1.60
Number	
Flow Type	Supercritical

LilaHydro2008.fm2 4/25/2008

Decided December		
Project Description	on	
Worksheet	DD-1a	
Flow Element	Triangular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.035	
Coefficient		
Slope	0.114 ft/ft	
Loft Cido Clans	200	
Left Side Slope	2.00 H : V	
Right Side Slope	2.00 H:V	
Discharge	0.37 cfs	
Discharge	0.37 CIS	
Results		_
		_
Depth	0.24 ft	
Flow Area	0.11 ft ²	
Wetted	1.07 ft	
Perimeter		
Top Width	0.96 ft	
Critical Depth	0.29 ft	
Critical Slope	0.039331 ft/ft	
Velocity	3.23 ft/s	
Velocity	0.16 ft	
Head	0.40.5	
Specific Energy	0.40 ft	
Froude	1.65	
Number	1.00	
Flow Type	Supercritical	
	L	

Project Description	on
Worksheet	DD-1b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
	Chambol Bopan
Input Data	
Mannings	0.035
Coefficient	
Slope	0.112 ft/ft
1 -6 014 01	000
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	0.50 -6-
Discharge	0.52 cfs
Results	
resuits	
Depth	0.27 ft
Flow Area	0.15 ft ²
Wetted	1.22 ft
Perimeter	
Top Width	1.09 ft
Critical Depth	0.33 ft
Critical Slope	0.037586 ft/ft
Velocity	3.49 ft/s
Velocity	0.19 ft
Head	
Specific	0.46 ft
Energy	4.07
Froude Number	1.67
Flow Type	Supercritical
i ion i ype	Superchilical

Project Description	on
Worksheet	DD-1b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
1 151	
Input Data	
Mannings	0.035
Coefficient	0.440.6%
Slope	0.112 ft/ft
Loff Side Slane	000
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H:V
Discharge	0.91 cfs
	3.3 . 3.6
Results	
Depth	0.34 ft
Flow Area	0.23 ft ²
Wetted	1.50 ft
Perimeter	
Top Width	1.35 ft
Critical Depth	0.42 ft
Critical Slope	0.034884 ft/ft
Velocity	4.02 ft/s
Velocity Head	0.25 ft
Specific	0.59 ft
Energy	
Froude Number	1.73
Flow Type	Supercritical

Project Descripti	
Project Description	on
Worksheet	DD-1c
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.100 ft/ft
1 - 6 00 1 - 01	000
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope Discharge	0.63 cfs
Discharge	0.65 CIS
Results	
Depth	0.30 ft
Flow Area	0.18 ft²
Wetted	1.34 ft
Perimeter	
Top Width	1.20 ft
Critical Depth	0.36 ft
Critical Slope	0.036639 ft/ft
Velocity	3.51 ft/s
Velocity	0.19 ft
Head	0.40 %
Specific Energy	0.49 ft
Froude	1.60
Number	1.00
Flow Type	Supercritical

Project Description	on	
Worksheet	DD-1c	-
Flow Element	Triangular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.035	
Coefficient		
Slope	0.100 ft/ft	
Laff Cida Olava	000	
Left Side Slope	2.00 H:V	
Right Side Slope	2.00 H:V	
Discharge	1.10 cfs	
Districtings	1.10 CIS	
Results		-
Results Depth	0.37 ft	
	0.37 ft 0.27 ft ²	
Depth		
Depth Flow Area Wetted Perimeter	0.27 ft ²	
Depth Flow Area Wetted Perimeter Top Width	0.27 ft² 1.65 ft 1.48 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth	0.27 ft ² 1.65 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope	0.27 ft² 1.65 ft 1.48 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity	0.27 ft ² 1.65 ft 1.48 ft 0.45 ft 0.034013 ft/ft 4.04 ft/s	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity	0.27 ft² 1.65 ft 1.48 ft 0.45 ft 0.034013 ft/ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head	0.27 ft ² 1.65 ft 1.48 ft 0.45 ft 0.034013 ft/ft 4.04 ft/s 0.25 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific	0.27 ft ² 1.65 ft 1.48 ft 0.45 ft 0.034013 ft/ft 4.04 ft/s	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head	0.27 ft ² 1.65 ft 1.48 ft 0.45 ft 0.034013 ft/ft 4.04 ft/s 0.25 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific Energy	0.27 ft ² 1.65 ft 1.48 ft 0.45 ft 0.034013 ft/ft 4.04 ft/s 0.25 ft 0.62 ft	

Project Description	on
Worksheet	DD-2a
Flow Element	
Method	Trapezoidal Channel
Solve For	Manning's Formula
Solve For	Channel Depth
Input Data	
14	0.005
Mannings Coefficient	0.035
Slope	0.120 ft/ft
	600
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Bottom Width	2.00 ft
Discharge	2.72 cfs
Results	
Depth	0.23 ft
Flow Area	0.56 ft²
Wetted	3.03 ft
Perimeter	5.65 H
Top Width	2.92 ft
Critical Depth	0.34 ft
Critical Slope	0.029303 ft/ft
Velocity	4.81 ft/s
Velocity	0.36 ft
Head	
Specific	0.59 ft
Energy	
Froude	1.93
Number	
Flow Type	Supercritical

Project Description	on
Worksheet	DD-2a
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
	·
Input Data	
Mannings	0.035
Coefficient	
Slope	0.120 ft/ft
	600
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope Bottom Width	200 #
Discharge	2.00 ft 7.14 cfs
Discharge	7.14 CIS
Results	
Donth	0.00 8
Depth Flow Area	0.39 ft
Wetted	1.10 ft²
Perimeter	3.76 ft
Top Width	3.58 ft
Critical Depth	0.60 ft
Critical Slope	0.025602 ft/ft
Velocity	6.49 ft/s
Velocity	0.66 ft
Head	0.00 It
Specific	1.05 ft
Energy	
Froude	2.06
Number	
Flow Type	Supercritical

Project Description	on
Worksheet	DD-2b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.102 ft/ft
	900
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope Bottom Width	2.00 ft
Discharge	2.81 cfs
Results	
Depth	0.24 ft
Flow Area	0.61 ft ²
Wetted	3.09 ft
Perimeter	
Top Width	2.98 ft
Critical Depth	0.35 ft
Critical Slope	0.029163 ft/ft
Velocity	4.61 ft/s
Velocity	0.33 ft
Head Specific	0.50.4
Energy	0.58 ft
Froude	1.80
Number	1.00
Flow Type	Supercritical
	•

Project Description	on
Worksheet	DD-2b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings Coefficient	0.035
Slope	0.102 ft/ft
- · - In -	900
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Bottom Width	2.00 ft
Discharge	7.29 cfs
Results	
Depth	0.42 ft
Flow Area	1.18 ft²
Wetted Perimeter	3.86 ft
Top Width	3.67 ft
Critical Depth	0.60 ft
Critical Slope	0.025530 ft/ft
Velocity .	6.18 ft/s
Velocity	0.59 ft
Head Specific	1.01 ft
Energy	
Froude Number	1.92
Flow Type	Supercritical

Project Description	on
Worksheet	DD-2c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings Coefficient	0.035
Slope	0.142 ft/ft
1 -# C:4- OI-	900
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Bottom Width	2.00 ft
Discharge	2.85 cfs
Results	
Depth	0.22 ft
Depth Flow Area	0.22 ft 0.55 ft ²
Flow Area Wetted	
Flow Area Wetted Perimeter	0.55 ft² 3.01 ft
Flow Area Wetted Perimeter Top Width	0.55 ft² 3.01 ft 2.90 ft
Flow Area Wetted Perimeter Top Width Critical Depth	0.55 ft² 3.01 ft 2.90 ft 0.35 ft
Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope	0.55 ft² 3.01 ft 2.90 ft 0.35 ft 0.029103 ft/ft
Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity	0.55 ft² 3.01 ft 2.90 ft 0.35 ft 0.029103 ft/ft 5.18 ft/s
Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity	0.55 ft² 3.01 ft 2.90 ft 0.35 ft 0.029103 ft/ft
Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity	0.55 ft² 3.01 ft 2.90 ft 0.35 ft 0.029103 ft/ft 5.18 ft/s
Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head	0.55 ft² 3.01 ft 2.90 ft 0.35 ft 0.029103 ft/ft 5.18 ft/s 0.42 ft

Project Descripti	on
Worksheet	DD-2c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings Coefficient	0.035
Slope	0.142 8/8
Olope	0.142 ft/ft 900
Left Side Slope	2.00 H : V
Right Side	2.00 H:V
Slope	
Bottom Width	2.00 ft
Discharge	7.37 cfs
Results	
Depth	0.38 ft
Flow Area	1.06 ft²
Wetted	3.71 ft
Perimeter	
Top Width	3.53 ft
Critical Depth	0.61 ft
Critical Slope	0.025493 ft/ft
Velocity	6.96 ft/s
Velocity Head	0.75 ft
Specific	1.14 ft
Energy Froude	2.24
Number	
Flow Type	Supercritical

Project Description	on	
Worksheet	DD-3	
Flow Element	Triangular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.035	
Coefficient		
Slope	0.006 ft/ft	
	000	
Left Side Slope	2.00 H:V	
Right Side	2.00 H:V	
Slope	0.44 - 6	
Discharge	0.11 cfs	
Results		
Results		
Depth	0.26 ft	
	· · ·	
Flow Area	0.14 ft²	
Wetted		
Wetted Perimeter	0.14 ft² 1.18 ft	
Wetted Perimeter Top Width	0.14 ft² 1.18 ft 1.05 ft	
Wetted Perimeter Top Width Critical Depth	0.14 ft² 1.18 ft 1.05 ft 0.18 ft	
Wetted Perimeter Top Width Critical Depth Critical Slope	0.14 ft² 1.18 ft 1.05 ft	
Wetted Perimeter Top Width Critical Depth Critical Slope Velocity	0.14 ft² 1.18 ft 1.05 ft 0.18 ft	
Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity	0.14 ft² 1.18 ft 1.05 ft 0.18 ft 0.046236 ft/ft	
Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head	0.14 ft ² 1.18 ft 1.05 ft 0.18 ft 0.046236 ft/ft 0.79 ft/s 0.01 ft	
Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific	0.14 ft² 1.18 ft 1.05 ft 0.18 ft 0.046236 ft/ft 0.79 ft/s	
Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific Energy	0.14 ft ² 1.18 ft 1.05 ft 0.18 ft 0.046236 ft/ft 0.79 ft/s 0.01 ft 0.27 ft	
Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific	0.14 ft ² 1.18 ft 1.05 ft 0.18 ft 0.046236 ft/ft 0.79 ft/s 0.01 ft	

Project Description	
Worksheet	DD-3
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.006 ft/ft
	000
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	
Discharge	0.21 cfs
Results	
Depth	0.34 ft
	0.34 ft 0.23 ft ²
Depth	****
Depth Flow Area	0.23 ft ²
Depth Flow Area Wetted	0.23 ft ²
Depth Flow Area Wetted Perimeter	0.23 ft ² 1.50 ft
Depth Flow Area Wetted Perimeter Top Width	0.23 ft² 1.50 ft 1.34 ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth	0.23 ft ² 1.50 ft 1.34 ft 0.23 ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope	0.23 ft ² 1.50 ft 1.34 ft 0.23 ft 0.042415 ft/ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity	0.23 ft ² 1.50 ft 1.34 ft 0.23 ft 0.042415 ft/ft 0.93 ft/s
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific	0.23 ft ² 1.50 ft 1.34 ft 0.23 ft 0.042415 ft/ft 0.93 ft/s
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific Energy	0.23 ft ² 1.50 ft 1.34 ft 0.23 ft 0.042415 ft/ft 0.93 ft/s 0.01 ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific Energy Froude	0.23 ft ² 1.50 ft 1.34 ft 0.23 ft 0.042415 ft/ft 0.93 ft/s 0.01 ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific Energy	0.23 ft ² 1.50 ft 1.34 ft 0.23 ft 0.042415 ft/ft 0.93 ft/s 0.01 ft 0.35 ft

Project Description	on
Worksheet	DD-4a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.110 ft/ft
Loff Cido Class	000
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Discharge	0.06 cfs
Dioditargo	0.00 013
Results	
Depth	0.12 ft
Flow Area	0.03 ft ²
Wetted	0.54 ft
Perimeter	
Top Width	0.49 ft
Critical Depth	0.14 ft
Critical Slope	0.050132 ft/ft
Velocity	2.02 ft/s
Velocity	0.06 ft
Head	
Specific	0.19 ft
Energy Froude	1.45
Number	1.40
Flow Type	Supercritical

Project Description	on
Worksheet	DD-4a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.110 ft/ft
	000
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	0.44
Discharge	0.11 cfs
Results	
Results	
Depth	0.15 ft
Flow Area	0.05 ft ²
Wetted	0.68 ft
Perimeter	
Top Width	0.61 ft
Critical Depth	0.18 ft
Critical Slope	0.046233 ft/ft
Velocity	2.35 ft/s
Velocity	0.09 ft
Head	
Specific	0.24 ft
Energy	
Froude	1.50
Number	.
Flow Type	Supercritical

Project Description	on
Worksheet	DD-4b
Flow Element	
Method	Triangular Channel
	Manning's Formula
Solve For	Channel Depth
Input Data	
Input Data	
Mannings	0.035
Coefficient	
Slope	0.102 ft/ft
	600
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	
Discharge	0.24 cfs
Results	
Depth	0.21 ft
Flow Area	0.09 ft ²
Wetted	0.93 ft
Perimeter	
Top Width	0.83 ft
Critical Depth	0.25 ft
Critical Slope	0.041670 ft/ft
Velocity	2.79 ft/s
Velocity	0.12 ft
Head	
Specific	0.33 ft
Energy	
Froude	1.53
Number	
Flow Type	Supercritical

Project Description	on
Worksheet	DD-4b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.102 ft/ft
1 -6 014 01	600
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope Discharge	0.44 cfs
Discharge	U.44 CIS
Results	
Depth	0.26 ft
Flow Area	0.14 ft²
Wetted	1.16 ft
Perimeter	
Top Width	1.04 ft
Critical Depth	0.31 ft
Critical Slope	0.038435 ft/ft
Velocity	3.24 ft/s
Velocity	0.16 ft
Head	
Specific	0.42 ft
Energy Froude	4.50
Number	1.58
Flow Type	Supercritical
, po	Caperonical

Project Description	on
Worksheet	DD-4c
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.100 ft/ft
1 -6 0:1- 01	000
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope Discharge	0.66 cfs
Discharge	0.66 CIS
Results	
Depth	0.30 ft
Flow Area	0.19 ft²
Wetted	1.36 ft
Perimeter	1.00 10
Top Width	1.22 ft
Critical Depth	0.37 ft
Critical Slope	0.036412 ft/ft
Velocity	3.55 ft/s
Velocity	0.20 ft
Head	3.23
Specific	0.50 ft
Energy	
Froude	1.61
Number	_
Flow Type	Supercritical

Project Description	on
Worksheet	DD-4c
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.100 ft/ft
Loft Cido Olana	000
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Discharge	1.15 cfs
Discharge	1.13 CIS
Results	
Depth	0.38 ft
Flow Area	0.28 ft ²
Wetted	1.68 ft
Perimeter	
Top Width	1.50 ft
Critical Depth	0.46 ft
Critical Slope	0.033812 ft/ft
Velocity	4.08 ft/s
Velocity	0.26 ft
Head	
Specific	0.63 ft
Energy Froude	1.66
Number	1.66
	Oran manufel and
Flow Type	Supercritical

Project Description	on
Worksheet	DD-5a
Flow Element	
Method	Triangular Channel
Solve For	Manning's Formula
Solve For	Channel Depth
Innut Data	
Input Data	
Mannings	0.035
Coefficient	
Slope	0.131 ft/ft
1 - ((0) 1 - 0)	100
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	0.05 (
Discharge	0.05 cfs
DII	
Results	
Depth	0.11 ft
Flow Area	0.02 ft ²
Wetted	0.49 ft
Perimeter	
Top Width	0.44 ft
Critical Depth	0.13 ft
Critical Slope	0.051359 ft/ft
Velocity	2.06 ft/s
Velocity	0.07 ft
Head	
Specific	0.18 ft
Energy	
Froude	1.55
Number	
Flow Type	Supercritical

Project Description	on	
Worksheet	DD-5a	
Flow Element	Triangular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.035	
Coefficient		
Slope	0.131 ft/ft	
Laft Cida Olasa	100	
Left Side Slope	2.00 H:V	
Right Side Slope	2.00 H:V	
Discharge	0.09 cfs	
Discharge	0.03 CIS	
Results		<u>-</u>
Results Depth	0.14 ft	
	0.14 ft 0.04 ft²	
Depth Flow Area Wetted	**** ***	
Depth Flow Area Wetted Perimeter	0.04 ft² 0.61 ft	
Depth Flow Area Wetted Perimeter Top Width	0.04 ft² 0.61 ft 0.55 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth	0.04 ft ² 0.61 ft 0.55 ft 0.17 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope	0.04 ft² 0.61 ft 0.55 ft 0.17 ft 0.047489 ft/ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity	0.04 ft ² 0.61 ft 0.55 ft 0.17 ft 0.047489 ft/ft 2.39 ft/s	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity	0.04 ft² 0.61 ft 0.55 ft 0.17 ft 0.047489 ft/ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head	0.04 ft ² 0.61 ft 0.55 ft 0.17 ft 0.047489 ft/ft 2.39 ft/s 0.09 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific	0.04 ft ² 0.61 ft 0.55 ft 0.17 ft 0.047489 ft/ft 2.39 ft/s	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head	0.04 ft ² 0.61 ft 0.55 ft 0.17 ft 0.047489 ft/ft 2.39 ft/s 0.09 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific Energy	0.04 ft ² 0.61 ft 0.55 ft 0.17 ft 0.047489 ft/ft 2.39 ft/s 0.09 ft 0.23 ft	

Project Description	on
Worksheet	DD-5b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings Coefficient	0.035
Slope	0.111 ft/ft
Siohe	100
Left Side Slope	2.00 H : V
Right Side	2.00 H : V
Slope	2.00 11. 4
Discharge	0.16 cfs
Results	
Depth	0.18 ft
Flow Area	0.06 ft ²
Wetted	0.79 ft
Perimeter	
Top Width	0.70 ft
Critical Depth	0.21 ft
Critical Slope	0.043980 ft/ft
Velocity	2.59 ft/s
Velocity	0.10 ft
Head Specific Energy	0.28 ft
Froude Number	1.54
Flow Type	Supercritical

Project Description	on	_
Worksheet	DD-5b	_
Flow Element	Triangular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
	·	
Input Data		
Mannings	0.035	
Coefficient		
Slope	0.111 ft/ft	
Loff Cido Clans	100	
Left Side Slope	2.00 H:V	
Right Side Slope	2.00 H:V	
Discharge	0.30 cfs	
2.conargo	0.00 013	
Results		
Depth	0.22 ft	
Flow Area	0.10 ft ²	
Wetted	0.99 ft	
Perimeter		
Top Width	0.89 ft	
Critical Depth	0.27 ft	
Critical Slope	0.040446 ft/ft	
Velocity	3.04 ft/s	
Velocity	0.14 ft	
Head Specific	0.07.6	
Specific Energy	0.37 ft	
Froude	1.61	
Number	1.01	
Flow Type	Supercritical	

Project Description	on
Worksheet	DD-5c
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	0.035
Slope	0.095 ft/ft
	200
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	
Discharge	0.45 cfs
Results	
Depth	0.27 ft
Flow Area	0.14 ft ²
Wetted	1.19 ft
Perimeter	
Top Width	1.07 ft
Critical Depth	0.32 ft
Critical Slope	0.038319 ft/ft
Velocity	3.17 ft/s
Velocity	0.16 ft
Head	
Specific	0.42 ft
Energy	
Froude	1.53
Number	Company different
Flow Type	Supercritical

Desired Desired		
Project Description		
Worksheet	DD-5c	
Flow Element	Triangular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
	·	
Input Data		
Mannings	0.035	
Coefficient		
Slope	0.095 ft/ft	
	200	
Left Side Slope	2.00 H:V	
Right Side	2.00 H:V	
Slope	0.70	
Discharge	0.79 cfs	
Results		
Depth	0.33 ft	
Flow Area	0.22 ft ²	
Wetted	1.47 ft	
Perimeter		
Top Width	1.32 ft	
Critical Depth	0.40 ft	
Critical Slope	0.035549 ft/ft	
Velocity	3.65 ft/s	
Velocity	0.21 ft	
Head		
	0 = 4 6	
Specific	0.54 ft	
Specific Energy		
Specific	0.54 ft 1.59	

Project Descripti	
Project Description	
Worksheet	DD-6a
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings Coefficient	0.040
Slope	0.180 ft/ft
	000
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Bottom Width	3.00 ft
Discharge	2.94 cfs
Results	
Depth	0.19 ft
Flow Area	0.62 ft²
Wetted	3.83 ft
Perimeter Top Width	3.74 ft
Critical Depth	0.29 ft
Critical Slope	0.038670 ft/ft
Velocity	4.71 ft/s
Velocity	0.34 ft
Head Specific	0.53 ft
Energy Froude Number	2.03
Flow Type	Supercritical

Droinet Descripti		
	Project Description	
Worksheet	DD-6a	
Flow Element	Trapezoidal Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.040	
Coefficient		
Slope	0.180 ft/ft	
1 - (1 0) 1 - 01	000	
Left Side Slope	2.00 H:V	
Right Side	2.00 H:V	
Slope	2.00 #	
Bottom Width	3.00 ft	
Discharge	7.55 cfs	
Results		
Results		
Depth	0.32 ft	
Flow Area	1.17 ft²	
Wetted	4.43 ft	
Perimeter		
Top Width	4.28 ft	
Critical Depth	0.52 ft	
Critical Slope	0.033399 ft/ft	
Velocity	6.47 ft/s	
Velocity	0.65 ft	
Head Specific	0.07.6	
Specific Energy	0.97 ft	
Froude	2.19	
Number	2.10	
Flow Type	Supercritical	
	•	

Project Description	on
Worksheet	DD-6b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	0.033
Slope	0.025 ft/ft
•	600
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Bottom Width	1.00 ft
Discharge	4.54 cfs
# loonargo	4.04 013
Results	
Depth	0.60 ft
Flow Area	1.32 ft²
Wetted	3.69 ft
Perimeter	
Top Width	3.40 ft
Critical Depth	0.59 ft
Critical Slope	0.027318 ft/ft
Velocity	3.43 ft/s
Velocity Head	0.18 ft
Specific	0.78 ft
_'	0.70 11
Enerav	
Energy Froude	0.97
~-	0.97

Project Description	
Worksheet	DD-6b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.025 ft/ft
	600
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	4.00 #
Bottom Width	1.00 ft
Discharge	10.82 cfs
Results	
Depth	0.90 ft
Flow Area	0.90 ft 2.52 ft²
Wetted	2.52 II ⁻ 5.03 ft
Perimeter	5.03 π
Top Width	4.60 ft
Critical Depth	0.91 ft
Critical Slope	0.024474 ft/ft
Velocity	4.29 ft/s
Velocity	0.29 ft
Head	0.20 It
Specific	1.19 ft
Energy	
Froude	1.02
Number Flow Type	
	Supercritical

Project Description	
Worksheet	
	DD-6c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.033 ft/ft
	800
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Bottom Width	1.00 ft
Discharge	1.18 cfs
Discharge	1.10 CIS
Results	
Depth	0.28 ft
Flow Area	0.45 ft²
Wetted	2.27 ft
Perimeter	
Top Width	2.14 ft
Critical Depth	0.29 ft
Critical Slope	0.032550 ft/ft
Velocity	2.64 ft/s
Velocity	0.11 ft
Head Specific	0.39 ft
Energy	0.55 II
Froude	1.02
Number Flow Type	Supercritical

Project Description	
Worksheet	DD-6c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings Coefficient	0.035
Slope	0.033 ft/ft
Ciopo	800
Left Side Slope	2.00 H : V
Right Side	2.00 H:V
Slope	
Bottom Width	1.00 ft
Discharge	2.40 cfs
Results	
Depth	0.41 ft
Flow Area	0.75 ft ²
Wetted	2.84 ft
Perimeter	
Top Width	2.64 ft
Critical Depth	0.42 ft
Critical Slope	0.029643 ft/ft
Velocity	3.21 ft/s
Velocity	0.16 ft
Head	
Specific	0.57 ft
Energy	4.00
Froude Number	1.06
Flow Type	Supercritical
1 1044 1 Abe	Supercritical

Project Description	on
Worksheet	DD-7
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
	·
Input Data	
Mannings	0.035
Coefficient	
Slope	0.010 ft/ft
	800
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope Bottom Width	1.00 %
	1.00 ft 2.45 cfs
Discharge	2.45 CIS
Results	
Depth	0.55 ft
Flow Area	1.15 ft²
Wetted	3.46 ft
Perimeter	
Top Width	3.20 ft
Critical Depth	0.43 ft
Critical Slope	0.029564 ft/ft
Velocity	2.12 ft/s
Velocity	0.07 ft
Head	
Specific	0.62 ft
Energy Froude	0.62
Number	0.02
Flow Type	Subcritical

Project Description	on
Worksheet	DD-7
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.010 ft/ft
	800
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	
Bottom Width	1.00 ft
Discharge	4.31 cfs
Results	
Depth Results	0.72 ft
	0.72 ft 1.75 ft²
Depth	
Depth Flow Area	1.75 ft²
Depth Flow Area Wetted	1.75 ft²
Depth Flow Area Wetted Perimeter	1.75 ft² 4.22 ft
Depth Flow Area Wetted Perimeter Top Width	1.75 ft² 4.22 ft 3.88 ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth	1.75 ft² 4.22 ft 3.88 ft 0.58 ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope	1.75 ft² 4.22 ft 3.88 ft 0.58 ft 0.027500 ft/ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity	1.75 ft² 4.22 ft 3.88 ft 0.58 ft 0.027500 ft/ft 2.46 ft/s
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific	1.75 ft² 4.22 ft 3.88 ft 0.58 ft 0.027500 ft/ft 2.46 ft/s
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific Energy	1.75 ft² 4.22 ft 3.88 ft 0.58 ft 0.027500 ft/ft 2.46 ft/s 0.09 ft 0.81 ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific Energy Froude	1.75 ft² 4.22 ft 3.88 ft 0.58 ft 0.027500 ft/ft 2.46 ft/s 0.09 ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific Energy	1.75 ft² 4.22 ft 3.88 ft 0.58 ft 0.027500 ft/ft 2.46 ft/s 0.09 ft 0.81 ft

Project Description	on
Worksheet	DD-8a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
	enamor Bopar
Input Data	
Mannings	0.035
Coefficient	
Slope	0.204 ft/ft
	200
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	0 40 5
Discharge	0.10 cfs
Results	
Depth	0.13 ft
Flow Area	0.03 ft ²
Wetted	0.59 ft
Perimeter	
Top Width	0.53 ft
Critical Depth	0.17 ft
Critical Slope	0.046828 ft/ft
Velocity	2.90 ft/s
Velocity	0.13 ft
Head	
Specific	0.26 ft
Energy	
Froude	1.99
Number	0
Flow Type	Supercritical

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Project Description	on
Worksheet	DD-8a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.204 ft/ft
	200
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	
Discharge	0.19 cfs
Results	
Depth	0.17 ft
Flow Area	0.06 ft ²
Wetted	0.75 ft
Perimeter	
Top Width	0.67 ft
Critical Depth	0.22 ft
Critical Slope	0.042986 ft/ft
Velocity	3.40 ft/s
Velocity	0.18 ft
Head	
Specific	0.35 ft
Energy	
Froude	2.08
Number	0
Flow Type	Supercritical

Project Description	on
Worksheet	DD-8b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
	·
Input Data	
Mannings	0.035
Coefficient	
Slope	0.078 ft/ft
	100
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	4.00 %
Bottom Width	1.00 ft
Discharge	2.91 cfs
Results	
Depth	0.37 ft
Flow Area	0.63 ft ²
Wetted	2.64 ft
Perimeter	
Top Width	2.46 ft
Critical Depth	0.47 ft
Critical Slope	0.028916 ft/ft
Velocity	4.59 ft/s
Velocity	0.33 ft
Head	0.00 %
Specific	0.69 ft
Energy Froude	1.59
Number	1.39
Flow Type	Supercritical
	- aportinual

Project Description	on
Worksheet	DD-8b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
	ename, Depar
Input Data	
Mannings	0.035
Coefficient	
Slope	0.078 ft/ft
	100
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	4.00 %
Bottom Width	1.00 ft
Discharge	5.24 cfs
Results	
Depth	0.49 ft
Flow Area	0.98 ft²
Wetted	3.20 ft
Perimeter	
Top Width	2.97 ft
Critical Depth	0.64 ft
Critical Slope	0.026826 ft/ft
Velocity	5.37 ft/s
Velocity Head	0.45 ft
Specific	0.94 ft
Energy	4.05
Froude Number	1.65
Flow Type	Supercritical

Project Description	on
Worksheet	DD-8c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
	endimer 2 optin
Input Data	· · · · · · · · · · · · · · · · · · ·
Mannings	0.040
Coefficient	
Slope	0.103 ft/ft
Laft Cida Olama	400
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Bottom Width	2.00 ft
Discharge	6.12 cfs
Distriarge	0.12 03
Results	
Depth	0.41 ft
Flow Area	0.41 ft ²
Wetted	3.82 ft
Perimeter	3.02 II
Top Width	3.63 ft
Critical Depth	0.55 ft
Critical Slope	0.034142 ft/ft
Velocity	5.35 ft/s
Velocity	0.44 ft
Head	0.1.1.11
Specific	0.85 ft
Energy	
Froude	1.68
Number	.
Flow Type	Supercritical

Project Description	on
Worksheet	DD-8c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
	• '
Input Data	
Mannings	0.040
Coefficient	
Slope	0.103 ft/ft
	400
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	0.00 %
Bottom Width	2.00 ft
Discharge	14.03 cfs
Results	
Depth	0.63 ft
Flow Area	2.07 ft ²
Wetted	4.83 ft
Perimeter	
Top Width	4.53 ft
Critical Depth	0.86 ft
Critical Slope	0.030599 ft/ft
Velocity	6.78 ft/s
Velocity	0.72 ft
Head	
Specific	1.35 ft
Energy	
Froude	1.77
Number Flow Type	Supercritical
	Caporoniloai

Project Description	on
Worksheet	DD-9
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	0.400 515
Slope	0.100 ft/ft
Left Side Slope	000 2.00 H : V
Right Side	2.00 H : V
Slope	2.00 11. V
Discharge	0.04 cfs
- · · · · · · · · · · · · · · · · · · ·	
Results	
Depth	0.11 ft
Flow Area	0.02 ft ²
Wetted	0.48 ft
Perimeter	
Top Width	0.43 ft
Critical Depth	0.12 ft
Critical Slope	0.052913 ft/ft
Velocity	1.76 ft/s
Velocity	0.05 ft
Head Specific	0.15 ft
Specific Energy	0. 13 It
Froude	1.35
Number	
Flow Type	Supercritical

Project Description	
Project Description	on
Worksheet	DD-9
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.100 ft/ft
1 - 6 00 1 - 01	000
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	0.07 -f-
Discharge	0.07 cfs
Results	
Depth	0.13 ft
Flow Area	0.03 ft ²
Wetted	0.59 ft
Perimeter	
Top Width	0.53 ft
Critical Depth	0.15 ft
Critical Slope	0.049110 ft/ft
Velocity	2.03 ft/s
Velocity	0.06 ft
Head	
Specific	0.20 ft
Energy	
Froude	1.40
Number	0 ''' 1
Flow Type	Supercritical

Project Description	on
Worksheet	DD-10
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.030 ft/ft
	200
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope Bottom Width	1.00 ft
Discharge	2.19 cfs
Discharge	2.19 CIS
5	
Results	
Depth	0.40 ft
Flow Area	0.73 ft ²
Wetted	2.80 ft
Perimeter	
Top Width	2.61 ft
Critical Depth	0.40 ft
Critical Slope	0.029996 ft/ft
Velocity	3.00 ft/s
Velocity	0.14 ft
Head Specific	0.54.0
Specific Energy	0.54 ft
Froude	1.00
Number	1.00
Flow Type	Supercritical
= =	•

Project Description	on
Worksheet	DD-10
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.030 ft/ft
. "	200
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope Bottom Width	4.00.6
	1.00 ft
Discharge	3.73 cfs
Results	
Depth	0.53 ft
Flow Area	1.08 ft²
Wetted	3.35 ft
Perimeter	
Top Width	3.10 ft
Critical Depth	0.53 ft
Critical Slope	0.028011 ft/ft
Velocity	3.46 ft/s
Velocity Head	0.19 ft
Specific	0.71 ft
Energy	5
Froude	1.04
Number Flow Type	Supercritical
) i -	

Project Description	on	
Worksheet	DD-11	
Flow Element	Triangular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.035	
Coefficient		
Slope	0.050 ft/ft	
1 - ((0) 1 - 0)	600	
Left Side Slope	2.00 H:V	
Right Side	2.00 H:V	
Slope	0.50	
Discharge	0.52 cfs	
Results		
Depth	0.32 ft	
Flow Area	0.20 ft ²	
Wetted	1.42 ft	
Perimeter		
Top Width	1.27 ft	
Critical Depth	0.33 ft	
Critical Slope	0.037587 ft/ft	
Velocity	2.59 ft/s	
Velocity	0.10 ft	
Head		
ricad		
Specific	0.42 ft	
Specific Energy	0.42 ft	
Specific Energy Froude	0.42 ft 1.15	
Specific Energy		

Project Description	on
Worksheet	DD-11
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings Coefficient	0.035
Slope	0.050 ft/ft
-	600
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	
Discharge	0.89 cfs
Results	
Depth	0.39 ft
Flow Area	0.30 ft ²
Wetted	1.73 ft
Perimeter	
Top Width	1.55 ft
Critical Depth	0.42 ft
Critical Slope	0.034988 ft/ft
Velocity	2.97 ft/s
	2.31 103
Velocity	0.14 ft
Velocity Head	
Head Specific	
Head	0.14 ft

Project Description	on
Worksheet	DD-13a
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.025 ft/ft
1 -6 011 01	300
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Bottom Width	1.00 ft
Discharge	3.06 cfs
Results	
Depth	0.50 ft
Flow Area	0.99 ft²
Wetted	3.23 ft
Perimeter	
Top Width	2.99 ft
Critical Depth	0.48 ft
Critical Slope	0.028730 ft/ft
Velocity	3.08 ft/s
Velocity Head	0.15 ft
i icau	
Specific	0.65 ft
Energy	
	0.65 ft 0.94

Project Description	on
Worksheet	DD-13a
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings Coefficient	0.035
Slope	0.025 ft/ft
1	300
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	
Bottom Width	1.00 ft
Discharge	5.27 cfs
Results	
. toodito	
Depth	0.65 ft
	0.65 ft 1.48 ft²
Depth	
Depth Flow Area Wetted Perimeter	1.48 ft²
Depth Flow Area Wetted	1.48 ft²
Depth Flow Area Wetted Perimeter	1.48 ft² 3.89 ft
Depth Flow Area Wetted Perimeter Top Width	1.48 ft² 3.89 ft 3.59 ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity	1.48 ft² 3.89 ft 3.59 ft 0.64 ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity	1.48 ft ² 3.89 ft 3.59 ft 0.64 ft 0.026806 ft/ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head	1.48 ft ² 3.89 ft 3.59 ft 0.64 ft 0.026806 ft/ft 3.55 ft/s 0.20 ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific	1.48 ft² 3.89 ft 3.59 ft 0.64 ft 0.026806 ft/ft 3.55 ft/s
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head	1.48 ft ² 3.89 ft 3.59 ft 0.64 ft 0.026806 ft/ft 3.55 ft/s 0.20 ft
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific Energy	1.48 ft ² 3.89 ft 3.59 ft 0.64 ft 0.026806 ft/ft 3.55 ft/s 0.20 ft 0.84 ft

Project Description	on
Worksheet	DD-13b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.032 ft/ft
Left Side Slope	300 2.00 H : V
Right Side	2.00 H : V
Slope	2.00 11. V
Bottom Width	1.00 ft
Discharge	3.58 cfs
Results	
Depth	0.51 ft
Flow Area	1.02 ft²
Wetted	3.26 ft
Perimeter	
Top Width	3.03 ft
Critical Depth	0.52 ft
Critical Slope	0.028158 ft/ft
Velocity	3.51 ft/s
Velocity Head	0.19 ft
Specific	0.70 ft
Energy	0.70 R
Froude	1.07
Number	
Flow Type	Supercritical

Project Description	on
Worksheet	DD-13b
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings Coefficient	0.035
Slope	0.032 ft/ft
	300
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	4.00 %
Bottom Width	1.00 ft
Discharge	6.16 cfs
Results	
Depth	0.66 ft
Flow Area	1.52 ft²
Wetted	3.94 ft
Perimeter	
Top Width	3.63 ft
Critical Depth	0.69 ft
Critical Slope	0.026281 ft/ft
Velocity	4.05 ft/s
Velocity	0.25 ft
Head Specific	0.91 ft
Energy Froude Number	1.10
CALLELLINGE	

Project Description	on	
Worksheet	DD-13c	_
Flow Element	Trapezoidal Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings Coefficient	0.035	
Slope	0.033 ft/ft	
	000	
Left Side Slope	2.00 H:V	
Right Side	2.00 H:V	
Slope Bottom Width	4.00 #	
	1.00 ft 5.77 cfs	
Discharge	3.77 CIS	
=		
Results		
Results Depth	0.63 ft	
Depth	0.63 ft 1.44 ft² 3.84 ft	
Depth Flow Area	1.44 ft²	
Depth Flow Area Wetted Perimeter Top Width	1.44 ft²	
Depth Flow Area Wetted Perimeter Top Width Critical Depth	1.44 ft² 3.84 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope	1.44 ft² 3.84 ft 3.54 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity	1.44 ft² 3.84 ft 3.54 ft 0.67 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity	1.44 ft² 3.84 ft 3.54 ft 0.67 ft 0.026500 ft/ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head	1.44 ft² 3.84 ft 3.54 ft 0.67 ft 0.026500 ft/ft 4.01 ft/s 0.25 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific	1.44 ft² 3.84 ft 3.54 ft 0.67 ft 0.026500 ft/ft 4.01 ft/s	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head	1.44 ft² 3.84 ft 3.54 ft 0.67 ft 0.026500 ft/ft 4.01 ft/s 0.25 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific Energy	1.44 ft² 3.84 ft 3.54 ft 0.67 ft 0.026500 ft/ft 4.01 ft/s 0.25 ft 0.88 ft	

Project Description	on
Worksheet	DD-13c
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
	ondinio. Dopur
Input Data	
Mannings	0.035
Coefficient	
Slope	0.033 ft/ft
1.601.01	000
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope Bottom Width	100 #
	1.00 ft
Discharge	9.89 cfs
Results	
Depth	0.82 ft
Flow Area	2.15 ft ²
Wetted	4.65 ft
Perimeter	
Top Width	4.26 ft
Critical Depth	0.87 ft
Critical Slope	0.024753 ft/ft
Velocity	4.61 ft/s
Velocity Head	0.33 ft
Specific	1.15 ft
Energy Froude	4.44
Number	1.14
Flow Type	Supercritical

Project Description	on
Worksheet	DD-13d
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.012 ft/ft
	500
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Bottom Width	3.00 ft
Discharge	6.35 cfs
Discharge	0.00 GS
-	
Results	
	0.57 ft
Results	0.57 ft 2.36 ft²
Results Depth	
Results Depth Flow Area	2.36 ft²
Results Depth Flow Area Wetted Perimeter Top Width	2.36 ft ² 5.55 ft 5.28 ft
Results Depth Flow Area Wetted Perimeter Top Width Critical Depth	2.36 ft² 5.55 ft
Results Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope	2.36 ft ² 5.55 ft 5.28 ft
Results Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity	2.36 ft ² 5.55 ft 5.28 ft 0.46 ft
Results Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity	2.36 ft ² 5.55 ft 5.28 ft 0.46 ft 0.026236 ft/ft
Results Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head	2.36 ft ² 5.55 ft 5.28 ft 0.46 ft 0.026236 ft/ft 2.69 ft/s 0.11 ft
Results Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific	2.36 ft ² 5.55 ft 5.28 ft 0.46 ft 0.026236 ft/ft 2.69 ft/s
Results Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head	2.36 ft ² 5.55 ft 5.28 ft 0.46 ft 0.026236 ft/ft 2.69 ft/s 0.11 ft
Results Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific Energy	2.36 ft ² 5.55 ft 5.28 ft 0.46 ft 0.026236 ft/ft 2.69 ft/s 0.11 ft 0.68 ft

Droinet Descripti	
Project Description	on
Worksheet	DD-13d
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.012 ft/ft
1 -6 014 - 01	500
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Bottom Width	3.00 ft
Discharge	14.50 cfs
Discharge	14.50 CIS
Results	
Depth	0.89 ft
Flow Area	4.25 ft ²
Wetted	6.98 ft
Perimeter	0.50.6
Top Width	6.56 ft
Critical Depth	0.75 ft
Critical Slope	0.023311 ft/ft
Velocity	3.41 ft/s
Velocity Head	0.18 ft
Specific	1.07 ft
Energy	1.07 11
Froude	0.75
Number	0.70
Flow Type	Subcritical
* *	

Project Description	on	
Worksheet	DD-13e	
Flow Element	Trapezoidal Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		_
Mannings	0.035	
Coefficient		
Slope	0.047 ft/ft	
	800	
Left Side Slope	2.00 H:V	
Right Side	2.00 H:V	
Slope Bottom Width	200 8	
	3.00 ft	
Discharge	6.54 cfs	
Results		
Depth	0.40 ft	
Depth Flow Area	1.52 ft²	
Depth Flow Area Wetted	,	
Depth Flow Area Wetted Perimeter	1.52 ft² 4.79 ft	
Depth Flow Area Wetted Perimeter Top Width	1.52 ft ² 4.79 ft 4.60 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth	1.52 ft ² 4.79 ft 4.60 ft 0.47 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope	1.52 ft² 4.79 ft 4.60 ft 0.47 ft 0.026120 ft/ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity	1.52 ft² 4.79 ft 4.60 ft 0.47 ft 0.026120 ft/ft 4.31 ft/s	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity	1.52 ft² 4.79 ft 4.60 ft 0.47 ft 0.026120 ft/ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head	1.52 ft² 4.79 ft 4.60 ft 0.47 ft 0.026120 ft/ft 4.31 ft/s 0.29 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity	1.52 ft² 4.79 ft 4.60 ft 0.47 ft 0.026120 ft/ft 4.31 ft/s	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific	1.52 ft² 4.79 ft 4.60 ft 0.47 ft 0.026120 ft/ft 4.31 ft/s 0.29 ft	
Depth Flow Area Wetted Perimeter Top Width Critical Depth Critical Slope Velocity Velocity Head Specific Energy	1.52 ft² 4.79 ft 4.60 ft 0.47 ft 0.026120 ft/ft 4.31 ft/s 0.29 ft 0.69 ft	

Project Description	on
Worksheet	DD-13e
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.047 ft/ft
1 -6 014 - 01	800
Left Side Slope	2.00 H : V
Right Side Slope	2.00 H:V
Bottom Width	3.00 ft
Discharge	14.88 cfs
Discharge	14.00 CIS
Results	
Depth	0.63 ft
Flow Area	2.68 ft ²
Wetted	5.82 ft
Perimeter	
Top Width	5.52 ft
Critical Depth	0.77 ft
Critical Slope	0.023228 ft/ft
Velocity	5.54 ft/s
Velocity Head	0.48 ft
Specific	1.11 ft
Energy	1.11 10
Froude	1.40
Number	
Flow Type	Supercritical

Project Description	on
Worksheet	DD-14a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
	endimer Bepar
Input Data	
Mannings	0.035
Coefficient	
Slope	0.087 ft/ft
	200
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	0.00
Discharge	0.23 cfs
Results	
Depth	0.21 ft
Flow Area	0.09 ft²
Wetted	0.94 ft
Perimeter	0.04 11
Top Width	0.84 ft
Critical Depth	0.24 ft
Critical Slope	0.041908 ft/ft
Velocity	2.59 ft/s
Velocity	0.10 ft
Head	5.15 K
Specific	0.32 ft
Energy	
Froude	1.41
Froude Number Flow Type	1.41 Supercritical

Project Description	00
Worksheet	DD-14a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Innut Data	
Input Data	
Mannings	0.035
Coefficient	
Slope	0.087 ft/ft
	200
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	0.00
Discharge	0.39 cfs
Results	
Depth	0.00.#
Flow Area	0.26 ft
	0.13 ft²
Wetted	1.15 ft
Perimeter	4.00.4
Top Width	1.03 ft
Critical Depth	0.30 ft
Critical Slope	0.039057 ft/ft
Velocity	2.96 ft/s
Velocity Head	0.14 ft
Specific	0.20.8
Energy	0.39 ft
Froude	1.46
Number	1.40
Flow Type	Supercritical
	por or mour

Project Description	on	
Worksheet	DD-14b	
Flow Element	Triangular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.035	
Coefficient		
Slope	0.031 ft/ft	
Loff Cido Class	500	
Left Side Slope	2.00 H:V	
Right Side Slope	2.00 H:V	
Discharge	0.56 cfs	
Diodrialgo	0.00 013	
Results		
Depth	0.36 ft	
Flow Area	0.25 ft ²	
Wetted	1.59 ft	
Perimeter		
Top Width	1.42 ft	
Critical Depth	0.34 ft	
Critical Depth Critical Slope	0.34 ft 0.037217 ft/ft	
Critical Depth Critical Slope Velocity	0.34 ft 0.037217 ft/ft 2.21 ft/s	
Critical Depth Critical Slope Velocity Velocity	0.34 ft 0.037217 ft/ft	
Critical Depth Critical Slope Velocity Velocity Head	0.34 ft 0.037217 ft/ft 2.21 ft/s 0.08 ft	
Critical Depth Critical Slope Velocity Velocity Head Specific	0.34 ft 0.037217 ft/ft 2.21 ft/s	
Critical Depth Critical Slope Velocity Velocity Head	0.34 ft 0.037217 ft/ft 2.21 ft/s 0.08 ft 0.43 ft	
Critical Depth Critical Slope Velocity Velocity Head Specific Energy	0.34 ft 0.037217 ft/ft 2.21 ft/s 0.08 ft	
Critical Depth Critical Slope Velocity Velocity Head Specific Energy Froude	0.34 ft 0.037217 ft/ft 2.21 ft/s 0.08 ft 0.43 ft	

Project Description	on
Worksheet	DD-14b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.031 ft/ft
Loff Cido Clana	500
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Discharge	0.95 cfs
Diodrialgo	0.93 CIS
Results	
Depth	0.43 ft
Flow Area	0.38 ft ²
Wetted	1.94 ft
Perimeter	
Top Width	1.73 ft
Critical Depth	0.43 ft
Critical Slope	0.034685 ft/ft
Velocity	2.52 ft/s
Velocity	0.10 ft
Head	
Specific	0.53 ft
Energy Froude	0.06
Number	0.96
Flow Type	Subcritical

Project Description	on
Worksheet	DD-15a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
	·
Input Data	
Mannings	0.035
Coefficient	
Slope	0.097 ft/ft
Loft Cido Class	000
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Discharge	0.26 cfs
Distriarge	0.20 618
Results	
Depth	0.22 ft
Flow Area	0.09 ft ²
Wetted	0.97 ft
Perimeter	
Top Width	0.86 ft
Critical Depth	0.25 ft
Critical Slope	0.041227 ft/ft
Velocity	2.78 ft/s
Velocity	0.12 ft
Head	
Specific	0.34 ft
Energy	4.40
Froude Number	1.49
Flow Type	Supercritical
i low Type	Supercritical

Project Descripti	
Project Description	on
Worksheet	DD-15a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.097 ft/ft
	000
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	0.44
Discharge	0.44 cfs
Results	
Depth	0.26 ft
Flow Area	0.14 ft ²
Wetted	1.18 ft
Perimeter	
Top Width	1.05 ft
Critical Depth	0.31 ft
Critical Slope	0.038434 ft/ft
Velocity	3.18 ft/s
Velocity	0.16 ft
Head	
Specific	0.42 ft
Energy	
Froude	1.54
Number	C
Flow Type	Supercritical

Project Description	
Worksheet	DD-15b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.040 ft/ft
Laft Cida Olama	700
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Discharge	0.66 cfs
Discharge	0.00 615
Results	
Depth	0.36 ft
Flow Area	0.26 ft ²
Wetted	1.61 ft
Perimeter	
Top Width	1.44 ft
Critical Depth	0.37 ft
Critical Slope	0.036411 ft/ft
Velocity	2.54 ft/s
Velocity	0.10 ft
Head	
Specific	0.46 ft
Energy Froude	1.05
Number	1.05
Flow Type	Supercritical

Project Description	on	
Worksheet	DD-15b	
Flow Element	Triangular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.035	
Coefficient		
Slope	0.040 ft/ft	
Loff Cido Clans	700	
Left Side Slope	2.00 H:V	
Right Side Slope	2.00 H:V	
Discharge	1.11 cfs	
2.00.1a.g0		
Results		
Depth	0.44 ft	
Flow Area	0.38 ft ²	
Wetted	1.96 ft	
Perimeter		
Top Width	1.75 ft	
Critical Depth	0.45 ft	
Critical Slope	0.033973 ft/ft	
Velocity	2.89 ft/s	
Velocity	0.13 ft	
Head Specific	0.57.4	
Energy	0.57 ft	
Froude	4.00	
FIUUUE	1 09	
Number	1.09	
	1.09 Supercritical	

Project Description		
Worksheet	DD-16a	
Flow Element	Triangular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings Coefficient	0.035	
Slope	0.029 ft/ft	
	700	
Left Side Slope	2.00 H:V	
Right Side	2.00 H:V	
Slope		
Discharge	0.11 cfs	
Results		
Depth	0.20 ft	
Flow Area	0.08 ft ²	
Wetted	0.87 ft	
Perimeter		
Top Width	0.78 ft	
Critical Depth	0.18 ft	
Critical Slope	0.046236 ft/ft	
Velocity	1.44 ft/s	
Velocity	0.03 ft	
Head		
Specific	0.23 ft	
Energy Froude	0.04	
Number	0.81	
Flow Type	Subcritical	

Project Description	on
Worksheet	DD-16a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.029 ft/ft
1 -4 0:4 - 0:-	700
Left Side Slope	2.00 H:V
Right Side Slope	2.00 H:V
Discharge	0.19 cfs
Discharge	0.19 CIS
Results	
Depth	0.24 ft
Flow Area	0.12 ft²
Wetted	1.07 ft
Perimeter	
Top Width	0.96 ft
Critical Depth	0.22 ft
Critical Slope	0.042985 ft/ft
Velocity	1.65 ft/s
Velocity	0.04 ft
Head	
Specific	0.28 ft
Energy Froude	0.04
Number	0.84
Flow Type	Subcritical
) [3000111001

Project Description	On.	
Project Description		
Worksheet	DD-16b	
Flow Element	Triangular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.035	
Coefficient		
Slope	0.060 ft/ft	
	600	
Left Side Slope	2.00 H:V	
Right Side	2.00 H:V	
Slope	0.47	
Discharge	0.17 cfs	
D		
Results		
Depth	0.20 ft	
Flow Area	0.08 ft ²	
Wetted	0.90 ft	
Perimeter		
Top Width	0.80 ft	
Critical Depth	0.21 ft	
Critical Slope	0.043629 ft/ft	
Velocity	2.10 ft/s	
Velocity	0.07 ft	
Head		
Specific	0.27 ft	
Energy		
Froude	1.17	
Number Flow Type	Supercritical	

Project Description	on
Worksheet	DD-16b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.060 ft/ft
1 501 0	600
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	0.00
Discharge	0.29 cfs
Results	
Depth	0.25 ft
Flow Area	0.12 ft²
Wetted	1.10 ft
Perimeter	
Top Width	0.98 ft
Critical Depth	0.27 ft
Critical Slope	0.040630 ft/ft
Velocity	2.40 ft/s
Velocity	0.09 ft
Head	
Specific	0.34 ft
Energy	
Froude	1.21
Number	Our and Minut
Flow Type	Supercritical

Desired Desired	
Project Description	on
Worksheet	DD-17a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
	,
Input Data	
Mannings	0.035
Coefficient	
Slope	0.026 ft/ft
	800
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	0.04 - 6
Discharge	0.31 cfs
Results	
Depth	0.29 ft
Flow Area	0.17 ft ²
Wetted	1.31 ft
Perimeter	
Top Width	1.18 ft
Critical Depth	0.27 ft
Critical Slope	0.040270 ft/ft
Velocity	1.80 ft/s
Velocity	0.05 ft
Head	
Specific	0.34 ft
Energy	
Froude Number	0.83
Flow Type	Subcritical
i iow i ype	Subchilical

Project Description	on	
Project Description		
Worksheet	DD-17a	
Flow Element	Triangular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.035	
Coefficient		
Slope	0.026 ft/ft	
	800	
Left Side Slope	2.00 H:V	
Right Side	2.00 H:V	
Slope	0.52 -4-	
Discharge	0.53 cfs	
Deselle		
Results		
Depth	0.36 ft	
Flow Area	0.26 ft ²	
Wetted	1.61 ft	
Perimeter		
Top Width	1.44 ft	
Critical Depth	0.34 ft	
Critical Slope	0.037490 ft/ft	
Velocity	2.05 ft/s	
Velocity	0.07 ft	
Head		
Specific	0.42 ft	
Energy	0.05	
Froude Number	0.85	
Flow Type	Subcritical	
1 10W Type	Subchildal	

Project Description	on	
Worksheet	DD-17b	
Flow Element	Triangular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
	опанног ворит	
Input Data		
Mannings	0.035	
Coefficient		
Slope	0.041 ft/ft	
1 -4 0:4- 01	200	
Left Side Slope	2.00 H:V	
Right Side	2.00 H:V	
Slope Discharge	1.15 cfs	
Discharge	1.13 CIS	
Results		
Depth	0.44 ft	
Flow Area	0.39 ft ²	
Wetted	1.98 ft	
Perimeter		
Top Width	1.77 ft	
Critical Depth	0.46 ft	
Critical Slope	0.033813 ft/ft	
Velocity	2.93 ft/s	
Velocity	0.13 ft	
Head		
Specific	0.58 ft	
Energy Froude	4.40	
Number	1.10	
Flow Type	Supercritical	
	Cupercitical	

D : (D) : (
Project Description	
Worksheet	DD-17b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
	·
Input Data	
Mannings	0.035
Coefficient	
Slope	0.041 ft/ft
1 001 0	200
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope Discharge	1.06 of
Discharge	1.96 cfs
Results	
Depth	0.54 ft
Flow Area	0.59 ft ²
Wetted	2.42 ft
Perimeter	
Top Width	2.16 ft
Critical Depth	0.57 ft
Critical Slope	0.031492 ft/ft
Velocity	3.35 ft/s
Velocity	0.17 ft
Head	
Specific	0.72 ft
Energy	4.40
Froude Number	1.13
Flow Type	Supercritical
· ·ott i ypo	Supercitical

Project Descripti	
Project Description	on
Worksheet	DD-18a
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.028 ft/ft
	600
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	
Discharge	0.06 cfs
Results	
Depth	0.16 ft
Flow Area	0.05 ft ²
Wetted	0.70 ft
Perimeter	
Top Width	0.63 ft
Critical Depth	0.14 ft
Critical Slope	0.050132 ft/ft
Velocity	1.22 ft/s
Velocity	0.02 ft
Head	
Specific	0.18 ft
Energy	
Froude	0.77
Number	
Flow Type	Subcritical

Desired Desired			
Project Description	on		
Worksheet	DD-18a		
Flow Element	Triangular Channel		
Method	Manning's Formula		
Solve For	Channel Depth		
Input Data			
Mannings	0.035		
Coefficient			
Slope	0.028 ft/ft		
	600		
Left Side Slope	2.00 H:V		
Right Side	2.00 H:V		
Slope			
Discharge	0.10 cfs		
Results			
Results			
Depth	0.19 ft		
Flow Area	0.07 ft ²		
Wetted	0.85 ft		
Perimeter			
Top Width	0.76 ft		
Critical Depth	0.17 ft		
Critical Slope	0.046828 ft/ft		
Velocity	1.39 ft/s		
Velocity	0.03 ft		
Head			
Specific	0.22 ft		
Energy			
Froude	0.79		
Number	0 1 ''' 1		
Flow Type	Subcritical		

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Project Descrip	tion
Worksheet	DD-18b
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth
	·
Input Data	
Mannings	0.035
Coefficient	
Slope	0.035 ft/ft
	400
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	
Discharge	0.39 cfs
Results	
Depth	0.30 ft
Flow Area	0.18 ft ²
Wetted	1.36 ft
Perimeter	
Top Width	1.22 ft
Critical Depth	0.30 ft
Critical Slope	0.039056 ft/ft
Velocity	2.11 ft/s
Velocity	0.07 ft
Head	
Specific	0.37 ft
Energy	
Froude	0.95
Number	Ondo and the set
Flow Type	Subcritical

Project Descrip	tion
Worksheet	DD-18b
Flow Element	Triangular
	Channel
Method	Manning's
	Formula
Solve For	Channel Depth
Input Data	
Mannings	0.035
Coefficient	
Slope	0.035 ft/ft
	400
Left Side Slope	2.00 H:V
Right Side	2.00 H:V
Slope	
Discharge	0.66 cfs
Results	
Depth	0.37 ft
Flow Area	0.27 ft ²
Wetted	1.66 ft
Perimeter	
Top Width	1.48 ft
Critical Depth	0.37 ft
Critical Slope	0.036411 ft/ft
Velocity	2.41 ft/s
Velocity	0.09 ft
Head	
Specific	0.46 ft
Energy	0.00
Froude Number	0.99
Flow Type	Subcritical
1 10 M 1 Ahe	Jubultudi

Channel Depth Worksheet for Trapezoidal Channel

Project Description			
Worksheet	RD-1		
Flow Element	Trapezoidal Ch	annel	
Method	Manning's Forr		
Solve For	Channel Depth		
Input Data			
Mannings	0.035		
Coefficient	0.050000	6. 16.	
Slope	0.050000		
Left Side Slope		H:V	
Right Side Slope	2.00	H:V	
Bottom Width	3.00	ft	
Discharge	13.26		
Results			
Depth	0.58	ft	
Flow Area	2.44	ft²	
Wetted	5.61	ft	
Perimeter			
Top Width	5.34		
Critical Depth	0.72		
Critical Slope	0.023600	ft/ft	
Velocity	5.44	ft/s	
Velocity Head	0.46	ft	
Specific	1.04	ft	
Energy			
Froude Number	1.42		
Flow Type	Supercritical		
, po	ouperchilical		

Channel Depth Worksheet for Trapezoidal Channel

Project Description		
Worksheet	RD-2	
Flow Element	Trapezoidal Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.035	
Coefficient		
Slope	0.100000 ft/ft	
Left Side Slope	2.00 H:V	
Right Side	2.00 H:V	
Slope		
Bottom Width	3.00 ft	
Discharge	10.89 cfs	
Results		
Depth	0.43 ft	
Flow Area	1.67 ft ²	
Wetted	4.93 ft	
Perimeter		
Top Width	4.73 ft	
Critical Depth	0.64 ft	
Critical Slope	0.024259 ft/ft	
Velocity	6.52 ft/s	
Velocity	0.66 ft	
Head		
Specific	1.09 ft	
Energy		
Froude Number	1.93	
Flow Type	Supercritical	
1 1044 1 Abe	Supercritical	

Lila Canyon Mine Culvert Calculations

Project Description		-
Worksheet	DC-1	
Flow Element	Circular	
	Channel	
Method	Manning's	
	Formula	
Solve For	Channel	
	Depth	
Input Data		
	· · · · · · · · · · · · · · · · · · ·	
Mannings	0.024	
Coefficient	0.400000	C1 (C1
Slope	0.133300	
Diameter		in
Discharge	7.29	cfs
Results		
Depth	0.61	ft
Flow Area	0.68	ft²
Wetted	2.08	ft
Perimeter		
Top Width	1.47	ft
Critical Depth	1.05	ft
Percent Full	40.9	%
Critical Slope	0.023666	ft/ft
Velocity	10.72	ft/s
Velocity Head	1.79	ft
Specific	2.40	ft
Energy		
Froude	2.78	
Number		
Maximum	22.35	cfs
Discharge		_
Discharge Full	20.77	
Slope Full	0.016417	ft/ft
Flow Type	Supercritical	

Project Descripti	on	
Worksheet	DC-2	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.025	
Coefficient	0.020	
Slope	0.107 ft/ft	
•	700	
Diameter	18 in	
Discharge	0.91 cfs	
Results		
Depth	0.23 ft	
Flow Area	0.17 ft ²	
Wetted	1.21 ft	
Perimeter		
Top Width	1.08 ft	
Critical Depth	0.36 ft	
Percent Full	15.3 %	
Critical Slope	0.018323 ft/ft	
Velocity	5.31 ft/s	
Velocity Head	0.44 ft	
Specific	0.67 ft	
Energy		
Froude	2.35	
Number		
Maximum	19.28 cfs	
Discharge		
Discharge Full	17.92 cfs	
Slope Full	0.000278 ft/ft	
Flow Type	Supercritical	

Project Descripti	on	
Worksheet	DC-3	
Flow Element	Circular Chann	el
Method	Manning's Forr	nula
Solve For	Channel Depth	1
	•	
Input Data		W
Mannings	0.025	
Coefficient		
Slope	0.030 ft/ft	
	300	
Diameter	18 in	
Discharge	7.37 cfs	
Results		
Depth	0.99	ft
Flow Area	1.24	ft²
Wetted	2.85	ft
Perimeter		
Top Width	1.42	ft
Critical Depth	1.05	ft
Percent Full	66.1	%
Critical Slope	0.025868	ft/ft
Velocity	5.94	ft/s
Velocity Head	0.55	ft
Specific	1.54	ft
Energy		
Froude	1.12	
Number		_
Maximum	10.23	cts
Discharge Discharge Full	0.54	-f-
•	9.51	0.0
Slope Full	0.018207	ππ
Flow Type	Supercritical	

Project Descripti	on		
Worksheet	DC-4		
Flow Element	Circular Channel		
Method	Manning's Formula		
Solve For	Channel Depth		
Input Data			
Mannings	0.025		
Coefficient			
Slope	0.215 ft/ft		
5. .	000		
Diameter	18 in		
Discharge	0.21 cfs		
Results			
Depth	0.10 ft		
Flow Area	0.05 ft ²		
Wetted	0.77 ft		
Perimeter			
Top Width	0.74 ft		
Critical Depth	0.17 ft		
Percent Full	6.5 %		
Critical Slope	0.020771 ft/ft		
Velocity	4.35 ft/s		
Velocity Head	0.29 ft		
Specific	0.39 ft		
Energy	2.22		
Froude Number	3.00		
Maximum	27.24 cfs		
Discharge	27.24 (13		
Discharge Full	25.33 cfs		
Slope Full	0.000015 ft/ft		
Flow Type	Supercritical		
. 3 i			

Project Descripti	on	
•		
Worksheet	DC-5	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.025	
Coefficient		
Slope	0.120 ft/ft	
D	000	
Diameter	18 in	
Discharge	0.30 cfs	
Results		
Depth	0.13 ft	
Flow Area	0.08 ft²	
Wetted	0.90 ft	
Perimeter		
Top Width	0.85 ft	
Critical Depth	0.20 ft	
Percent Full	8.8 %	
Critical Slope	0.019986 ft/ft	
Velocity	3.95 ft/s	
Velocity Head	0.24 ft	
Specific	0.37 ft	
Energy		
Froude	2.33	
Number Maximum	00.05(
Discharge	20.35 cfs	
Discharge Full	18.92 cfs	
Slope Full	0.000030 ft/ft	
Flow Type	Supercritical	
. ion Type	Superchilical	

Project Descripti	on	
Worksheet	DC-6	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.025	
Coefficient		
Slope	0.050 ft/ft	
5.	000	
Diameter	18 in	
Discharge	7.55 cfs	
Results		
Depth	0.85 ft	
Flow Area	1.04 ft²	
Wetted	2.56 ft	
Perimeter		
Top Width	1.49 ft	
Critical Depth	1.06 ft	
Percent Full	56.9 %	
Critical Slope	0.026305 ft/ft	
Velocity	7.27 ft/s	
Velocity Head	0.82 ft	
Specific	1.68 ft	
Energy	4.50	
Froude Number	1.53	
Maximum	13.14 cfs	
Discharge	13.14 (15	
Discharge Full	12.21 cfs	
Slope Full	0.019107 ft/ft	
Flow Type	Supercritical	
	p	

Project Descripti	on	_
Worksheet	DC-7	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
33.73.73.	Chamer Beput	
Input Data		—
Mannings	0.025	—
Coefficient		
Slope	0.464 ft/ft	
	000	
Diameter	18 in	
Discharge	4.31 cfs	
Results		
Depth	0.34 ft	
Flow Area	0.31 ft²	
Wetted	1.50 ft	
Perimeter		
Top Width	1.26 ft	
Critical Depth	0.80 ft	
Percent Full	23.0 %	
Critical Slope	0.020400 ft/ft	
Velocity	14.05 ft/s	
Velocity Head	3.07 ft	
Specific	3.41 ft	
Energy		
Froude	5.03	
Number Maximum	40.00 ata	
Discharge	40.02 cfs	
Discharge Full	37.21 cfs	
Slope Full	0.006227 ft/ft	
Flow Type	Supercritical	
5 1,700	Caperontical	

Project Description	on	
Worksheet	DC-8	
Flow Element	Circular Channel	
Method		
Solve For	Manning's Formula	
Solve Fol	Channel Depth	
Input Data		
Monnings	0.005	
Mannings Coefficient	0.025	
Slope	0.388 ft/ft	
Оюро	000	
Diameter	24 in	
Discharge	13.22 cfs	
Results		_
Depth	0.58 ft	_
Flow Area	0.75 ft ²	
Wetted	2.26 ft	
Perimeter		
Top Width	1.81 ft	
Critical Depth	1.31 ft	
Percent Full	28.8 %	
Critical Slope	0.021657 ft/ft	
Velocity	17.69 ft/s	
Velocity Head	4.86 ft	
Specific	5.44 ft	
Energy Froude	4.05	
Number	4.85	
Maximum	78.82 cfs	
Discharge	10.02 613	
Discharge Full	73.27 cfs	
Slope Full	0.012631 ft/ft	
Flow Type	Supercritical	

		
Project Descripti	on	
Worksheet	DC-9	·· <u></u>
Flow Element	Circular Channe	el
Method	Manning's Form	ula
Solve For	Channel Depth	
Input Data		-
Mannings	0.025	
Coefficient		
Slope	0.057 ft/ft	
	000	
Diameter	18 in	
Discharge	1.15 cfs	
Results		
Depth	0.30	ft
Flow Area	0.25	ft²
Wetted	1.39	ft
Perimeter		
Top Width	1.20	ft
Critical Depth	0.40	ft
Percent Full	20.1	%
Critical Slope	0.018135	ft/ft
Velocity	4.55	•
Velocity Head	0.32	. •
Specific	0.62	ft
Energy		
Froude Number	1.75	
Maximum	14.03	ofo
Discharge	14.03	UI5
Discharge Full	13.04	cfs
Slope Full	0.000443	
Flow Type	Supercritical	
→ 1 · · ·	p	

Project Descripti	on
Worksheet	DC-10
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth
	·
Input Data	
Mannings	0.025
Coefficient	
Slope	0.142 ft/ft
.	500
Diameter	18 in
Discharge	1.94 cfs
Results	
Depth	0.31 ft
Flow Area	0.26 ft ²
Wetted	1.42 ft
Perimeter	
Top Width	1.22 ft
Critical Depth	0.52 ft
Percent Full	20.7 %
Critical Slope	0.018269 ft/ft
Velocity	7.33 ft/s
Velocity Head	0.83 ft
Specific	1.15 ft
Energy	0.77
Froude Number	2.77
Maximum	22.18 cfs
Discharge	22.10 03
Discharge Full	20.62 cfs
Slope Full	0.001262 ft/ft
Flow Type	Supercritical
	•

Project Descripti	000	
Worksheet	DC-11	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.025	
Coefficient	3.323	
Slope	0.046 ft/ft	
·	000	
Diameter	18 in	
Discharge	2.80 cfs	
Results		
Depth	0.50 ft	
Flow Area	0.51 ft²	
Wetted	1.84 ft	
Perimeter		
Top Width	1.41 ft	
Critical Depth	0.64 ft	
Percent Full	33.3 %	
Critical Slope	0.018804 ft/ft	
Velocity	5.44 ft/s	
Velocity Head	0.46 ft	
Specific	0.96 ft	
Energy		
Froude	1.59	
Number		
Maximum	12.60 cfs	
Discharge	44.74	
Discharge Full	11.71 cfs	
Slope Full	0.002628 ft/ft	
Flow Type	Supercritical	

Decised Decise	
Project Descripti	on
Worksheet	DC-12
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth
Input Data	
Mannings	0.025
Coefficient	
Slope	0.040 ft/ft
D	000
Diameter	18 in
Discharge	3.73 cfs
Results	
Depth	0.60 ft
Flow Area	0.67 ft ²
Wetted	2.06 ft
Perimeter	
Top Width	1.47 ft
Critical Depth	0.74 ft
Percent Full	40.3 %
Critical Slope	0.019705 ft/ft
Velocity	5.60 ft/s
Velocity Head	0.49 ft
Specific	1.09 ft
Energy Froude	4.47
Number	1.47
Maximum	11.75 cfs
Discharge	11.75 GS
Discharge Full	10.92 cfs
Slope Full	0.004664 ft/ft
Flow Type	Supercritical
7 F	- > p

Project Descripti	on	
Worksheet	DC-12	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
	•	
Input Data		
Mannings	0.025	
Coefficient		
Slope	0.033 ft/ft	
	300	
Diameter	24 in	
Discharge	14.50 cfs	
Results		
Depth	1.20 ft	
Flow Area	1.98 ft ²	
Wetted	3.55 ft	
Perimeter		
Top Width	1.96 ft	
Critical Depth	1.37 ft	
Percent Full	60.2 %	
Critical Slope	0.022857 ft/ft	
Velocity	7.34 ft/s	
Velocity Head	0.84 ft	
Specific	2.04 ft	
Energy		
Froude	1.29	
Number		
Maximum	23.09 cfs	
Discharge	04.47	
Discharge Full	21.47 cfs	
Slope Full	0.015195 ft/ft	
Flow Type	Supercritical	

Project Descripti	on	
Worksheet	DC-14	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
	•	
Input Data		
Mannings	0.025	
Coefficient		
Slope	0.033 ft/ft	
.	300	
Diameter	18 in	
Discharge	1.34 cfs	
Results		
Depth	0.37 ft	
Flow Area	0.34 ft ²	
Wetted	1.56 ft	
Perimeter		
Top Width	1.29 ft	
Critical Depth	0.43 ft	
Percent Full	24.8 %	
Critical Slope	0.018114 ft/ft	
Velocity	3.93 ft/s	
Velocity Head	0.24 ft	
Specific	0.61 ft	
Energy		
Froude	1.35	
Number Maximum	40.70 -5-	
Discharge	10.72 cfs	
Discharge Full	9.97 cfs	
Slope Full	0.000602 ft/ft	
Flow Type	Supercritical	
, po	ouperontical	

Drained Dans 1 41		
Project Descripti		
Worksheet	DC-15	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
	•	
Input Data	A	
Mannings	0.025	
Coefficient		
Slope	0.033 ft/ft	
	300	
Diameter	18 in	
Discharge	0.19 cfs	
Results		
Depth	0.14 ft	
Flow Area	0.09 ft ²	
Wetted	0.94 ft	
Perimeter		
Top Width	0.88 ft	
Critical Depth	0.16 ft	
Percent Full	9.6 %	
Critical Slope	0.020905 ft/ft	
Velocity	2.20 ft/s	
Velocity Head	0.08 ft	
Specific	0.22 ft	
Energy		
Froude	1.24	
Number	40 770 6	
Maximum	10.72 cfs	
Discharge Discharge Full	0.07 of	
•	9.97 cfs	
Slope Full	0.000012 ft/ft	
Flow Type	Supercritical	

Project Descripti	on
Worksheet	DC-16
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth
	•
Input Data	
Mannings	0.025
Coefficient	
Slope	0.033 ft/ft
D: 4	300
Diameter	18 in
Discharge	0.53 cfs
Results	
Depth	0.24 ft
Flow Area	0.18 ft²
Wetted	1.22 ft
Perimeter	
Top Width	1.09 ft
Critical Depth	0.27 ft
Percent Full	15.7 %
Critical Slope	0.018890 ft/ft
Velocity	2.99 ft/s
Velocity Head	0.14 ft
Specific	0.37 ft
Energy	
Froude	1.31
Number Maximum	10.70 of
Discharge	10.72 cfs
Discharge Full	9.97 cfs
Slope Full	0.000094 ft/ft
Flow Type	_
i low Type	Supercritical

Project Descripti	on	
Worksheet	DC-17	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.025	
Coefficient		
Slope	0.040 ft/ft	
D	000	
Diameter	18 in	
Discharge	2.25 cfs	
Results		
Depth	0.46 ft	
Flow Area	0.46 ft²	
Wetted	1.76 ft	
Perimeter		
Top Width	1.38 ft	
Critical Depth	0.57 ft	
Percent Full	30.8 %	
Critical Slope	0.018367 ft/ft	
Velocity	4.87 ft/s	
Velocity Head	0.37 ft	
Specific	0.83 ft	
Energy Froude	4.40	
Number	1.49	
Maximum	11.75 cfs	
Discharge	7.11.0 0.0	
Discharge Full	10.92 cfs	
Slope Fuli	0.001697 ft/ft	
Flow Type	Supercritical	

Project Descripti	on	
Worksheet	DC-18	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.025	
Coefficient	0.020	
Slope	0.057 ft/ft	
	000	
Diameter	18 in	
Discharge	0.10 cfs	
Results		
Depth	0.09 ft	
Flow Area	0.05 ft ²	
Wetted	0.76 ft	
Perimeter		
Top Width	0.72 ft	
Critical Depth	0.12 ft	
Percent Full	6.2 %	
Critical Slope	0.022852 ft/ft	
Velocity	2.19 ft/s	
Velocity Head	0.07 ft	
Specific	0.17 ft	
Energy		
Froude	1.53	
Number		
Maximum Disebarge	14.03 cfs	
Discharge	42.04 -5-	
Discharge Full	13.04 cfs	
Slope Full	0.000003 ft/ft	
Flow Type	Supercritical	

Project Descripti	00	
Worksheet	DC-19	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		_
Mannings	0.025	
Coefficient		
Slope	0.025 ft/ft	
	000	
Diameter	18 in	
Discharge	1.11 cfs	
Results		
Depth	0.36 ft	
Flow Area	0.33 ft ²	
Wetted	1.54 ft	
Perimeter		
Top Width	1.29 ft	
Critical Depth	0.39 ft	
Percent Full	24.2 %	
Critical Slope	0.018124 ft/ft	
Velocity	3.36 ft/s	
Velocity Head	0.18 ft	
Specific	0.54 ft	
Energy		
Froude	1.17	
Number		
Maximum	9.29 cfs	
Discharge		
Discharge Full	8.64 cfs	
Slope Full	0.000413 ft/ft	
Flow Type	Supercritical	

Project Descripti		
Project Descripti	on	
Worksheet	UC-1	
Flow Element	Circular Channel	
Method	Manning's Formula	
Solve For	Channel Depth	
Input Data		
Mannings	0.025	
Coefficient		
Slope	0.045 ft/ft	
	800	
Diameter	60 in	
Discharge	52.32 cfs	
Results		
Depth	1.44 ft	
Flow Area	4.67 ft ²	
Wetted	5.66 ft	
Perimeter		
Top Width	4.53 ft	
Critical Depth	2.03 ft	
Percent Full	28.8 %	
Critical Slope	0.012470 ft/ft	
Velocity	11.19 ft/s	
Velocity Head	1.95 ft	
Specific	3.39 ft	
Energy		
Froude	1.94	
Number		
Maximum	311.76 cfs	
Discharge	200 02	
Discharge Full	289.82 cfs	
Slope Full	0.001493 ft/ft	
Flow Type	Supercritical	

Lila Canyon Mine APPENDIX 1 - Culvert Outlet Rip-Rap Apron Flow Velocity Calculations

Lila Canyon Worksheet for Circular Channel

UC-1 - Outlet Velocit	ty - (100/6)
Circular Channel	•
Manning's Formula	
Channel Depth	
t 0.025	
0.00500	ft/ft
48	in
52.32	cfs
3.25	ft
10.92	ft²
8.97	ft
3.13	ft
2.17	ft
81.1	%
0.014895	ft/ft
4.79	ft/s
0.36	ft
3.60	ft
0.45	
56.81	cfs
52.81	cfs
0.004907	ft/ft
	Circular Channel Manning's Formula Channel Depth at 0.025 0.00500 48 52.32 3.25 10.92 8.97 3.13 2.17 81.1 0.014895 4.79 0.36 3.60 0.45 56.81 52.81

Subcritical

Flow Type

Lila Canyon Worksheet for Trapezoidal Channel

Project Description	1
Worksheet	UC-1 - Apron Outlet - (100/6)
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.045	
Slope	0.001000	ft/ft
Left Side Slope	2.00	H:V
Right Side Slope	2.00	H:V
Bottom Width	9.00	ft
Discharge	52.32	cfs

Results		
Depth	2.49	ft
Flow Area	34.79	ft²
Wetted Perimeter	20.13	ft
Top Width	18.96	ft
Critical Depth	0.94	ft
Critical Slope	0.033208	ft/ft
Velocity	1.50	ft/s
Velocity Head	0.04	ft
Specific Energy	2.52	ft
Froude Number	0.20	
Flow Type	Subcritical	

Appendix 8-1

Reclamation Cost Estimates

Bonding Calculations Horse Canyon MineC/007/013 Lila Canyon Section

Bond Summary

Direct Costs

Subtotal Demolition and Removal Subtotal Backfilling and Grading Subtotal Revegetation Direct Costs	\$525,849.00 \$417,838.00 \$340,586.00 \$1,284,273.00	
Indirect Costs Mob/Demob	\$128,427.00	10.0%
Contingency Engineering Redesign	\$64,214.00 \$32,107.00	
Main Office Expense Project Mainagement Fee	\$87,331.00 \$32,107.00	6.8%
Subtotal Indirect Costs	\$344,186.00	26.8%
Total Cost	\$1,628,459.00	
Escalation factor Number of years		0.0444 3
Escalation	\$226,684.00	3
Reclamation Cost	\$1,855,143.00	
Bond Amount (rounded to nearest \$1,000) 2008 Dollars	\$1,855,000.00	
Bond Posted Up to May 2007	\$1,686,000.00	
Difference Between Cost Estimate and Bond Percent Difference	-\$169,000.00 -9.11%	

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Unit	\$77.194	\$90,803	\$505	\$13.487	left in place	\$1.848	1100	1100	\$1.421	left in place	347	28814	10201	\$7.044	2444	16256	876	392	\$6.20	\$3.254	18088	Left in Place	\$4,380	\$54,159	\$91.896	\$22,980	\$4,36	\$3,220	204										
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Describion	 Office Bathhouse	Shop Warehouse	Security Shack	Mine Substation	Underground Power Lines	Water Treatment Plant	Potable Water Tank	Process Water Tank	Sewer Tank	Drain Field	Ventilation Fan	Conveyor Tunnels to Coal Stockpile	Conveyor ROM Stockpile to Crusher	Conveyor Crusher to Loudout Bin	Conveyor Loudout Bin Truck Loadout	Reclaim Escape Tunnel Fan Fan House	ConveyorStoragePileStakingTube	Crusher Screen Plant	ruck Scale to Loadout	Coal Storage Bin	Guard Rail	Underground Pipes	hain Link Fence	Mine Facilities Rd Truck Loadout Rd	Office Bathhouse Warehouse Parking	Mine Parking	Fuel Tanks	Powder and Cap Magazine	Culverts										
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Control Cont	Description	Materials	Means Reference Number	Unit Cost	Chit	Гелдф	Width	Height Di	Diameter Area		Volume	Weight Density	sity Time	Number	ie Ž	Swell	Quantity	i i	Cost
Contact State Bild Large Contact Conta	Bathhouse		1 1										L	L					
Figure 1975	re's Demolition Cost	Steel Bld. Large	02220 110 0012	0	2 /CF	150	100	15					_		Ŀ		225000	٦.	45000
See Flower See	ıre's Vol. Demolished															0.3	l	ζ	
10.58 and Flower 10.58 and F	's Weight (exclude steel)																		
A	s Capacity																		
Courte demotions Courte demo	96																		
See Trace Section See Trace Section See Trace Section See Trace ortation Cost Non Steel Truck							-												
See Trace Section Se	ortation Cost Non Steel Drive						_	_								L	L		
Content ECOC ECOC SATON Content demotion al Cost Non Steel											-	_	_						
Colored ECOC	Weight									-					l	L			
The first blue EGOC SajrOx Sajr	Capacity					ľ		-	ŀ		-		-		ļ	L			
Coat									L				l	-				İ	
Contact the denominant Contact the denomin	ortation Cost Steel Truck										-					ļ			
FOOC FOOD	ortation Cost Steel Truck Drive															L			
Coart Corrected demosition Coart Cast Cas	I Cost Steel		ECDC	3,	NOL				_				480		lb/cf		9	to	21000
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Concrete demolifor	tling Cost							İ	1					l		-		1	
Concrete demolition ConcreteDemoi 3.37 CV 150 100 1 150 160 1 150 160 1 150 160 1 150 160 1 160	ent's Vol Demolished					1	+			1		-		1	1			ļ	
Cancerte demolition Cancerte Demol 3.97 CY 150 100 1	Coets				Ī		1			1	1	1	1		+			1	
Concrete demolition Concrete demolitical Concrete de	# Cooks					1	1	1		1			1					1	
Contracted demolition Contracted Demost S. Sty Cry 150 100 1	Costs										1	-		+					
Concrete demolition CancerteDemo1 3.97 CV 150 100 1 1.35 CV	elene.					ı	l		1	+	+				+	1		1	
Concrete demolitor						Ī			1	1	1	1	1	1	+				
Concrete demoition Concrete demoit 3.97 CV 150 100 1	Demolition				Ī				1	l	1		1	1	ļ	1			
Front and State of	Do Coet	Concrete demolition	Constant	,	2	9	90,	ļ	1	+	1	1	1	1	-	1			
Frent end bades 3 CV 02315 424 1300 1.39 CV 1.30 CV	'e Vol Demolished	Toplotten exercise	Conscience	9.9	2	200	3	1			ł	Ŧ	1	-	-	,		2 2	7022
12 Cr (16 Tan) Pump Truck 12 mit, 102315 430 3320	Coet	Front and lander 2 CV	0004 404 4000	۲	200		\dagger		1	1						?		5	
Charlet disposal	dation Cost	12 CV (16 Top) Dump Truck 1/9 mi	-02315 490 0320	2.6	2 2	1		l		1	+	1	1	1	1		57/	5 6	5001
	Costs	On eith dienoeal	0200 040 0500	,	2	İ		l	1	1	1	+					123	2	248/
	Costs	Of site disposal	05550 540 3330		5	ľ				1	1	Ŧ	+	1	+		723	ò	5495
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	Demolition									-	l			+	+				
	on Cost													<u> </u>	-			Ť	
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	Cost									-			ļ	<u> </u>				Ì	
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	Costs									_			-					l	
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	Cost									l		ŀ		1	<u> </u>			Ī	
	rtation Cost					İ												ł	
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ةً	Description	Materials	Means	i de	Chit	Length	Width	Height	Diameter Area		Volume	Weight	Density T	Time	Number	Unit Swell	Г	Quantity Unit	Cost	
			Number	1800	_											T ag				
	Shop Warehouse																-		-	
	Structure's Demolition Cost	Steel Bld. Large	02220 110 0012		0.2 /CF	¥	150 100	0 20							Ŀ		1	300000 CF	-	90000
	Structure's Vol. Demolished				_												0.3	3333 CY		
	Kubbie's Weight (exclude steel)					_								1						
	Incks Capacity				1															
	Taurage											1				,,-				
	transportation Cost Non Steel Truck				_												_			
	Transportation Cost Non-Steel Unive																			
	Disposal Cost Non Steel																_	L	L	
	Steel's Weight																-			
	Truck's Capacity													r		_			L	Ī
	Haulage												-				-			
	Transportation Cost Steel Truck				L		L									l	1		-	
L	Transportation Cost Steel Truck Drive					L						ľ	l	r	İ	T	-		-	Ī
		ECDC	ECDC		35/TON						-		480		<u>a</u>	lb/cf	ŀ	800 ton	L	28000
	Subtotal			_	-	_	_	_		-	-	-	-	-	-	-	-	-	-	88000
	Equipment 's Disposal Cost						1			T	T	1				1	+		+	
L	Dismantling Cost									Ī		T	l		ŀ	I			-	
	Equipment's Vol. Demolished				ļ					Ī	ľ			ł	1	I	1	1	+	Ī
L	Loading Costs				-		ļ		Ī	T	t	1	l	t	1	T	+	1	+	Ī
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	Hallsport Costs																-			
	Disposal Costs											1								
	Subtotal																			
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	Concrete Demolition																_	L		
	Demolition Cost	Concrete demolition	ConcreteDemo1	3.6	3.97[/CY	150	001 100	0.25		-					Н			139 CY	L	552
	I. Demolished												-		-		1.3	1811CY		Γ
		Front end loader 3 CY	02315 424 1300	-	1.39 /CY								l	ļ				181 CV	Ļ	252
	Cost	12 CY (16 Ton) Dump Truck 1/2 mi. r/02315 490 0320	02315 490 0320	2	3.44 /CY	L				İ					l	1	1	18107	L	16
		On site disposal	02220 240 5550	7	,6/CY				l	l	l				l	l		181 CV	-	1376
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	Concrete Demolition	****							T			Ì		\dagger		1	+	1	+	Ī
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L	Disposal Costs				L					ľ	İ		l		t	l			1	
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	Demolition Cost											1		l	t	T	1	1	\downarrow	I
	Concrete's Vol Demolished											t	1	t	1			1	1	
	Loading Cost									t	1	†	1	1		1	$\frac{1}{1}$		4	1
L	Transportation Cost									Ī		1	1	1	1	1			\downarrow	1
	Disposal Costs				-					İ	t	Ì		1	1	Ī	1		1	
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	Total								Ī	1	İ	İ	t	T	†	+	+	1	+	2000
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Page 3 of 31

Description	Materials	Means Reference Number	Cost	<u></u>	Length Width	Height	Diameter	Area	Volume	Weight	Density	Number	a Conit	Swell	Quantity	<u>o</u> <u> </u>	is cost
Security Shack												_	ŀ				
Structure's Demolition Cost	Steel Bld, Large	02220 110 0012	0.2 /	/CF	20	10	8						ᆸ		1600	R	320
Structure's Vol. Demolished														0.3	3 18	ςλ	
Rubble's Weight (exclude steel)													_				
Truck's Capacity																	
Haulage										_	L						
Transportation Cost Non Steel Truck																l	
Transportation Cost Non Steel Drive												_					
Disposal Cost Non Steel									-	L	L						
Veight									-	L							
Capacity																	
Haulage										l	l						
Transportation Cost Steel Truck				İ						l	1	1	1				
defice Cost Steel Truck Division				1					+	1							
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Lost Steel	ECDC	ECDC	35	NOI/ce							480		lp/cl		4	4 ton	-
Subtotal -			· -	-	-	_	-	-	-	-	-	-	-	-	-	-	460
Equipment's Disposal Cost										+	1		<u> </u>				
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nt's Vol. Demolished									-								
Loading Costs										-		L					
Transport Costs												1	1			1	
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Disposal Costs													-			-	
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Concrete Demolition										ŀ							
Demolition Cost	Concrete demolition	ConcreteDemo1	3.97 I/CY	<u>}</u>	20	10 0 25	25			L			L		ſ	1	
Concrete's Vol. Demolished								1	+					,		- 5 8	
oet.	Front and lander 2 CV	0000 FOR 1000	1100 4	ļ			1						1	٥.		5	
Tours defen Oce	AS ON ASSET	0000 424 1000	1.38/21				1	1			4				3	č	
ation cost	12 CY (16 Ion) Dump Iruck 1/2 ml. I	02315 490 0320	3.44 //												e	_ Շ	_
Disposal Costs	On site disposal 02220 240 5550	02220 240 5550	7.6 /CY	<u></u>		_			L		_				3	3CY	23
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Concrete Demolition											1						
Demolition Cost						l				1		+	1				
Concrete's Vol Demolished			1	1	1		1										
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Loading Cost									_					_			
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Concrete Demolition													L				
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Costs												L	L				
Subtotal																ľ	
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Description	Materials	Means Reference Number	Unit Cost	Length	Width	Height D	Diameter Area	Volume	Weight	t Density	Time	Number	Unit	Swell C	Quantity Unit	Cost	
Mine Substation														ľ		ŀ	
Structure's Demolition Cost									_							L	
Structure's Vol. Demolished											Ţ					-	
Rubble's Weight (exclude steel)	el)															_	
Truck's Capacity									L	_		_		-			
Haulage							-										
Transportation Cost Non Steel Truck	el Truck							_									
Transportation Cost Non Stee	al Drive																
Disposal Cost Non Steel																	
Steel's Weight																-	
Truck's Capacity						-					_			l			
Haulage											-				-		
Transportation Cost Steel Truck	ck							L	-				Ī			-	l
Transportation Cost Steel Truck Drive	ck Drive									-			İ				
Disposal Cost Steel								-					Ī			-	
Subtotal		_		-	-	-	-	-	-	-			•	-	-	-	
					1												
Equipment's Disposal Cost	Mechanical equipment heavy	15055 300 3600	805 /ton							4		4	Ę		16 ton	-	12880
Dismanding Cost										_						-	
Equipment's Vol. Demolished											-						
Loading Costs																	
Transport Costs																	
Disposal Costs																L	
Subtotal											Ц						12880
Equipment's Disposal Cost	Chain link remove 8'-10'	02220 220 1700	2.92 /LF	160			_			_			Ŀ		160 FT		46
Dismantling Cost																	
Equipment's Vol. Demolished								-		-							
Loading Costs														-		L	
Transport Costs														_		L	
Disposal Costs								_							_	L	
Subtotal					_												46
Concrete Demolition																	
Demolition Cost	Concrete demolition	ConcreteDemo1	3.97 /CY	20	20	0.5						4	FT		7)CY		2
Concrete's Vol. Demolished														1.3	9 CY		
Loading Cost	Front end loader 3 CY 02315 424 130	02315 424 1300	1.39/CY										-		9CY		_
Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi.	r 02315 490 0320	3.44 //CY										_		<u>}</u>		31
Disposal Costs	On site disposal	02220 240 5550	7.6/ICY												\ <u></u>		8
Subtotal								_									7
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Concrete Demolition											L		T	l		L	
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Revised August 2005

Demolition

1997 1997	Description	Materials	Means Reference Number	Cost	Unit	Length	Width	Height Dia	Diameter Area	Volume	Weight	Density	Time	Number	ii C	Swell Factor	Quantity	Unit	st
Steel Bid. Large C0220 110 001 2 0.2/OF 1500 150									-	_	-								
ECOC ECDC 33 TON 640 640		Steel Bld. Large	02220 110 0012	0.2	Ğ.			Ц		-	800				CF		1800	J)	360
ECDC ECDC 35 /TON									_							0.3	20	չ	
ECDC ECDC 33/TON 4600 gal. tank 02215 200 0110 545 Ea. 17 15 0000 gal. to 5000 gal. tank 02215 200 1102 3 5/TON 15 15 000 gal. to 5000 gal. tank 02215 201 1203 6400 Ea. 17 15 0000 gal. to 5000 gal. tank 02215 520 1203 13 9/TOY 15 15 000 Gal. tank 02215 520 1203 13 9/TOY 15 15 000 Gal. tank 02215 520 1203 13 9/TOY 15 15 000 Gal. tank 02215 520 0320 13 9/TOY 15 000 Gal. tank 02215 520 0320 13 9/TOY 15 000 Gal. tank 02215 520 0320 14 000 Gal. ta	el)						-						L						
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ECDC ECDC 35 frow								_			L			_					
ECDC ECDC 35/FON	Truck									_									
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ECDC ECDC 39/TON 4400														-				-	
Stock gal, to 5000 gal, tank C2115 200 0110 S45 Ea. S400 gal, to 5000 gal, tank C2115 200 0110 S45 Ea. S400 gal, to 5000 gal, tank C2115 200 1023 S400 Ea. S400 gal, to 5000 gal, tank C2115 200 1023 S400 Ea.											-	L		L					
Substituting State												-							
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ECDC ECDC ECDC 35/TON 640	ck Drive									l		\mid	+	-	ļ				
3000 gal to 5000 gal, tank 02115 200 0110 545 En. 1 3000 gal to 5000 gal, tank 02115 200 1023 680 En. 1 Conrate demollion ConcreteDemo! 3.97 pcv 15 16 0.5 Contrate demollion ConcreteDemo! 3.97 pcv 15 175 0.5 Contrate demollion ConcreteDemo! 3.97 pcv 15 pcv 12 p		ECDC	ECDC	35	NOT	T		+		-			08	-	Pice		4		1,
3000 gal. to 5000 gal tank 02115 200 0110 545 Ea. 17						1	-	-	-	-	-	_	-	-			-	-	535
3000 gal. to 5000 gal. tank (02115 200 1023 690 Ea. 11						ľ					-	-	_		I			+	
3000 gal. to 5000 gal. tank (02115 200 1023 680) Es. Contrariet demulition ContrateDemo 1 3.97 CY		3000 gal. to 5000 gal. tank	02115 200 0110	545	Ea.				L						1EA		-	1	545
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100 gal, tank 02115 200 1023 690 Ea.							l												
ition ConcreteDemot 3.97 CV		3000 gal. to 5000 gal. tank	02115 200 1023	069	Ea.		-	-			-				1 EA		1	EΑ	9
Nion ConcreteDemo1 3.97 /CV 16 16 0.6 3.07 /CV 1.30 /CV 1.39 /CV							l				-	-	L	-					1235
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iden Concetealemot 3.97 ICV 16 0.5 3. CV Dump Truck 12 mi 102215 450 0320 3.44 I/CV Dump Truck 12 mi 102215 450 0320 7.5 I/CV Dump Truck 12 mi 102215 450 0320 1.33 I/CV Dump Truck 12 mi 102215								-		-	L						l		
2 CY (02315 424 1300 1.39)(CY) Dump Truck 1/2 mi, 102215 480 0320 3.44)(CY) 02220 240 5550 7.5 (CY)		Concrete demolition	ConcreteDemo1	3.97	λΟ/	15	15	0.5			_				FF		40	ò	16
2.3 CY (2215 421300 C) Comp Truck 1/2 mi, 1/023/5 490 0320 C) C) C (2220 240 5550 C) C) C (2220 240 5550 C) C) C (2220 240 5550 C) C) C (2220 240 5550 C) C) C (2220 240 5550 C) C) C (2220 240 5550 C) C) C) C (2220 240 5550 C) C) C) C) C) C) C) C) C) C) C) C) C)											L	L				1.3	20	<u>.</u>	
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Filename DEMO07132004.xls, Worksheet PotableWaterTank

Printed 4/21/2008

Potable Water Tank		Reference Number	Cost	Length	Width	Height	Diameter Area	Volume	Weight	Density	Time	Number	Unit Swell Factor		Quantity	ts Cost	
C											L					-	
Structure's Demonition Cost	Steel Bld. Large	02220 110 0012	0.2 /CF			20	15						FT		3534 CF		707
Structure's Vol. Demolished														0.3	39 CY		
Rubble's Weight (exclude steel)																	
Iruck's Capacity									_	_							
Haulage																H	
Transportation Cost Non Steel Truck																	
Transportation Cost Non Steel Drive			_														
Disposal Cost Non Steel																	
Steel's Weight															_		
Truck's Capacity									L								
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Transportation Cost Steel Truck																-	
Transportation Cost Steel Truck Drive			_		L				L								
Jisposal Cost Steel	ECDC	ECDC	35/TON							480	-		lb/cf		9 ton		315
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duplinerit a Disposal Cost									-								
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quipment s Vol. Demolished																_	
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ıbtotal				_										_	L		
Concrete Demolition									L						_		
Demolition Cost	Concrete demolition	ConcreteDemo1	3.97 J/CY	1	15 15	9.0			L				F		4 C√	-	16
Concrete's Vol. Demolished														1.3	5 CY	L	Ī
Loading Cost	Front end loader 3 CY	02315 424 1300	1.39 /CY											_	5 CY		7
Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. n02315 490 0320	02315 490 0320	3.44 /CY											_	5ς	L	17
sposal Costs	On site disposal	02220 240 5550	7.6 /CY						L						5 CY		88
ıbtotal							-	-	Ц								78
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Printed 4/21/2008

Standard Content		Materials	Means Reference Number	Cost	- Pi	Length W	Width Hei	Height Diameter	ster Area	Volume	Weight	Density	Time	Number	Unit Swell Factor		Quantity Unit	Cost	İ
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Structure's Demolition Cost	will remain in place at reclamation						_									L
Structure's Vol. Demolished																Н
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I ruck's Capacity																
Haulage																
Transportation Cost Non Steel Truck																
Transportation Cost Non Steel Drive																
Disposal Cost Non Steel									_							
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Revised August 2005 Horse Canyon Mine Lila Project C/007/013



Second Communication Second Communication	Voodilption Fre	water rats	Means Reference Number	Cost	<u> </u>	rengan	mpika		Diameter Area	Volume	vveignt	Density	Ē	Number	i i	Factor	Cuanuty	Unit	ts
Figure F	n Fan 's Demolition Cost					1	+				1	-	1						
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bettel to the control of the control	Costs	On site disposal	02220 240 5550	7.6/10	<u>}</u>		-	L									06		
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Revised August 2005 Demoktion Horse Canyon Mine Lila Project C/007/013



Seed Bild, Large Cozgo 110 Bild Co	Description	Materials	Means Reference Number	Cost	ngua -	vidui neignt	t Diameter	r Area	Volume	Weight	Density	nu e u	Number	Factor	Cuantry	5	
Court Stead Bit Large Court Co	Conveyor Tunnels to Coal Stockpile																
100 100	ructure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2 /CF	810	9	50						ㅂ			JCF	19440
Mail Fired Mai	ructure's Vol. Demolished													0		lcY	
March Marc	ubble's Weight (exclude steel)																
Section Sect	uck's Capacity				_												
Accordance Acc	ulage				_									L			
See Flower See	insportation Cost Non Steel Truck							L									
The color February	insportation Cost Non Steel Drive							_					L				
Contract	posal Cost Non Steel												_			Ĺ	
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See Truck ECDC SeCOC SeCOC SeCOC SecOC S	ck's Capacity							-									
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Front end loader 3 CY 02316 4224 1390 139 IVY 200 IV	olition Cost	Concrete demolition	ConcreteDemo1	3.97 I/CY				L	15					_	15		99
Front end loader 3 CY	crete's Vol. Demolished															\ }	
12 CV (16 Ton) Dump Thuck 12 mi. f0220 240 5550	ding Cost	Front end loader 3 CY	02315 424 1300	1.39 /CY						l	-	-				2	,
On site disposal 02220 240 5650 7.6 fCV On site disposal O2220 240 5650 7.6 fCV Oz control Oz	sportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi.	102315 490 0320	3.44 /CY						İ		l			1 5) 	2
	osal Costs	On site disposal	02220 240 5550	76//07		-					ł			 	20	\ \{\chi_{2}}	4
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lished	crete Demolition					l	l	-		Ì		1	1				
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Dost Control of the C	Jing Cost																
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Revised August 2005 Demolition



	Materials	Means Reference Number	Cost	rengu			Sier Area	volume	weignt	Density	Number	5	Factor	Consum	nuit Cost	_
Conveyor Crusher to Loudout Bin						_					_			l	l	İ
Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2 /CF	2:	230 5	20						E		23000 CF	_	4600
Structure's Vol. Demolished													0.3	256 C	_	
Rubble's Weight (exclude steel)										_		L			-	
Truck's Capacity																
Haulage															-	
Transportation Cost Non Steel Truck																
Transportation Cost Non Steel Drive							_									
Disposal Cost Non Steel																
Steel's Weight									-	-					-	
Truck's Capacity											-			l	<u> </u>	
Haulage																
ransportation Cost Steel Truck					-									İ		
Transportation Cost Steel Truck Drive							_								-	
isposal Cost Steel	ECDC	ECDC	35 /TON							480		lb/cf		61 ton		213
Subtotal	-		_	_	-	-	_	-	-	-	-	-] -		-	6735
Equipment 's Disposal Cost							+	1		1	1	<u> </u>				
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Equipment's Vol. Demolished			+							1	1	1			1	
Loading Costs									1	1	1	1		1	1	
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Subtotal			1					1		1		1		Ì	-	
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Concrete Demolition											1	I		1	ł	
emolition Cost	Concrete demolition	ConcreteDemo1	3.97 /CY					15			_	I		150		, B
Concrete's Vol. Demolished												I	13	2000	ļ	
Loading Cost	Front end loader 3 CY 02315 424 1300	02315 424 1300	1.39/CY									I		000		۴
Transportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. n	02315 490 0320	3.44 /CY		L						-			20 C		9
sposal Costs	On site disposal	02220 240 5550	7.6 /CY											20C		152
ibtotal																309
Concrete Demolition														-		
Demolition Cost															_	
Concrete's Vol. Demolished																
Loading Cost														-		
Transportation Cost															-	
Disposal Costs															-	
Subtotal													ľ	-		
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Concrete Demolition									_							
Demolition Cost									-	l				1		İ
Concrete's Vol. Demolished									ļ	_		T		l		
Loading Cost										_	 -	Ī		ł	l	
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Control London Control Contr		Cesciption	Materials	Means Reference Number	Cost	<u>.</u>	V	A A A A A A A A A A A A A A A A A A A	Height Dia	Diameter Area	Volume	Weight	Density	Time	Number	Jit.	Swell	Quantity	Cost	
Total	10	onveyor Loudout Bin Truck Loadout											-	L					t	
Accordance Acc	#.	ucture's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2	/CF	9	9	20				L		-	Ŀ		500 CF	<u> </u>	9
Steel Truck Steel Truck	炽	ucture's Vol. Demolished															0.3	\ <u>C</u>	L	
Very Stead Truck Stead Tru	≳ા	bble's Weight (exclude steel)							\sqcup			H								
Steel Truck Steel Truck	41.5	lock's Capacity					1		+			+	-					1		
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Steel Truck ECDC 35/TON	1.9	posal Cost Non Steel					\dagger		$\frac{1}{1}$						+		1	Ì	+	
Steel Truck	٤	el's Weight									+	+				1	Ì	1	+	
Steel Truck ECDC 35/TON	ĮŽ	ck's Capacity					l					-	-	<u> </u>		Ī	T		+	
See Truck See Truck Sec Truck See Truck See Truck Sec Truck See	ag.	lage							-							Ī		ľ		
A Continue Drive ECDC ECDC 35/TON	ē	sportation Cost Steel Truck									-	ŀ				Ī			-	
A Coet ECDC ECDC Sol/TON	[≅	nsportation Cost Steel Truck Drive									-	-						l		
Contract demolition	圆	oosal Cost Steel	ECDC	ECDC	35	NOT	H							80		lp/ct		1 ton	<u> </u>	35
Host	5 .	ytotal		-	_	=	-	-	-	-	-	-	_	-	_	-	-	-	-	135
Concrete demolition	Įŧ	inment's Disposal Cost					+	1	+	1		+		+				1	+	
Indighted	H.ē	manting Cost					l	1		+	1	+							1	
September Concrete demolition Concrete Demo! S.97 CY	įĮį	ioment's Vol Demolished					+		+	1	1		+						1	
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wished Concrete demolition Concrete demolition Concrete demolition 12 CY (16 fon) Dump Truck 1/2 mi, 102316 480 1300 1.39 CY 10 cy (16 fon) Dump Truck 1/2 mi, 102316 480 550 7.6 CY Ished 7.6 CY	3 3	unig Costs				j	1										1		-	
Concrete demolifion ConcreteDemo1 3.97 CV Front end loader 3 CV ConcreteDemo1 1.39 CV 12 CV (16 Ton) Dump Truck 1/2 min 102315 424 1300 7.6 CV 12 CV (16 Ton) Dump Truck 1/2 min 102315 430 0320 7.6 CV 13 CV (16 Ton) Dump Truck 1/2 min 102315 430 0320 7.6 CV 14 CV (16 Ton) Dump Truck 1/2 min 102315 430 0320 7.6 CV 15 CV (16 Ton) Dump Truck 1/2 min 102315 430 0320 16 CV (16 Ton) Dump Truck 1/2 min 102315 430 0320 17 CV (16 Ton) Dump Truck 1/2 min 102315 430 0320 18 CV (16 Ton) Dump Truck 1/2 min 102315 18 CV (16 Ton) Dump Truck 1/2 m	ð.	ispoir costs					1	+						-						
Concrete demolition ConcreteDemo1 3.97 iCY	맑	osal Costs					1													
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Mished Front end loader 3 CY 02215 424 1300 12 CY (16 Ton) Dump Truck 1/2 mi. 102216 490 0320 On site disposal 02220 240 5550 12 CY (16 Ton) Dump Truck 1/2 mi. 102216 490 0320 On site disposal 02220 240 5550 12 CY (16 Ton) Dump Truck 1/2 mi. 102216 1300 1300 1300 1300 1300 1300 1300 13	틹	olition Cost	Concrete demolition	ConcreteDemo1	3.97	,c√						15						15 CY		9
Front and loader 3 CY 02215 42 1300 Front (and loader 3 CY 12 mi. 102216 420 1320 On site disposal 0220 240 5550 On site disposal 0220 240 5550 On site disposal 0220 240 5550 On site disposal 0220 240 5550 Ished	š١	rete's Vol. Demokshed								_	_						1.3	20 C	_	
12 CY (16 Ton) Dump Truck 1/2 m. 1/02215 449 0320 On site disposal Jished Jished	힑	ling Cost	Front end loader 3 CY	02315 424 1300	1.39	\c\											-	20107	_	28
lished On site disposal 00220 240 5550	딁	sportation Cost	12 CY (16 Ton) Dump Truck 1/2 mi. 1	02315 490 0320	3.44	ζ									L			20 CY	L	69
lished lished	Ы	osal Costs	On site disposal	02220 240 5550	7.6	/CY				_	L							20 CY	ŀ	152
rete Demoltion olition Cost ing Cost ing Cost cost of Cos	죍	otal				Ī		_								Ī			l	308
Terrete Demolition Integrated Services Integrated								-											ŀ	
lition Cost in Fig. 1	š	rete Demolition							_			L								
Intel® Vol. Demoished	틹	olition Cost							L	_										
This property This propert	š	rrete's Vol. Demolished					-		L				L					-	L	
Control	390	ling Cost					-									İ			_	
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Fig. 2	š	crete's Vol. Demolished				Ī		-			<u> </u>				-			İ		
sportation Cost osal Costs otal	ă	ing Cost					l												+	
osal Costs	ᇙ	sportation Cost				T						-	 -		\downarrow		T		1	
CORI	18	osal Costs											-			Ī	+			
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	Lotal	-				Ţ	+		+	+	1	+	+	\downarrow			†	+	$\frac{1}{1}$	

Describeou		Reference	Cost			2	Chameter Area	volume	veignt	Density	e E	admoet Cont	Factor	Cuantry	<u> </u>	1802
Reclaim Escape Tunnel Fan Fan House		Number	1									1	Ī		1	
Currugated Steel	Steel Bld. Large	02220 110 0012	0.2/CF					26	880			10	1	26880	ų,	2
Escape Tunnel	Steel Bld. Large	02220 110 0012	0.2 /CF					-	1257			5		1257	1257 CF	251
Fan	Steel Bld. Large	02220 110 0012	0.2//CF						64			2		79	n C	
Fan House	Steel Bld. Large	02220 110 0012	0.2 /CF						512	-		l'o		512	l l	
Structure's Vol. Demolished							-						<u> </u> -	319	L.	
Rubble's Weight (exclude steel)							1	_					Ì			
Truck's Capacity								-			Ī			+		
Haulage														-		
Transportation Cost Non Steel Truck								_							İ	
Transportation Cost Non Steel Drive															T	
Disposal Cost Non Steel																
Steel's Weight								L								
Truck's Capacity																
Haulage																
Transportation Cost Steel Truck																
Transportation Cost Steel Truck Drive	CCC		36							- 1						
Subtotal	2021		D. Jes				_			480		ID/CI		"	// ton	2695
												-				
Excavation and Backfill	4 4 4															
Redaim lunei	Excavation Bulk Bank 2 CY (322BL)	02315 424 0260	1.7 /CY	3	350 14	10						ᆸ		1815	ςλ	30
Redaim Tunnel	Backfill Trench Mininal Haul 2 1/4 CY 02315 610 3080	02315 610 3080	1.53 /CY											1815 CY	ζ	2777
Escape Tunnel	Excavation Bulk Bank 2 CY (322BL)	02315 424 0260	1.7//CY	3	325 4	1					_	FT		481	ζ	818
Escape lunnel	Backfill Trench Mininal Haul 2 1/4 CY	02315 610 3080	1.53/CY											481	ζ	736
1-4-44-1-0																
DOMORAL			1		\downarrow			+								7417
Concrete Demolition				†				+	1		1					
Demolition Cost	Concrete demolities	ConceptoDomor	VO1 70 C	 					-		1	1				
Concrete's Vol Demolished	Concrete demondon	ConcreteDemo	3.37 //Ct	1	1			1	20		1				اخ	
Loading Cost	Front and loader 3 CV	0024 A24 4200	VO1.00 +	<u> </u>							1	1	1.3		٥	
Transportation Cost	12 CV (16 Ton) Dump Trick 1/2 mi - 402315 424 1500	02213 424 1300	1.39/01			1					1			26	اد	36
isposal Costs	On eite dienosal	0220 240 5550	7/4/2											26 CY	2	
Subtotal		2000	2	l	-				 		1		 	Q	5	198
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Concrete Demolition									1		1				Ì	
emolition Cost									-						l	
Concrete's Vol. Demolished					-							l	l		l	
Loading Cost					_						-	-	l		t	
Transportation Cost											-				f	
Disposal Costs															\dagger	
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Concrete's Vol. Demolished				I				-			l	1	 		\dagger	
Loading Cost											l	l			İ	
Transportation Cost											t		 	1	ł	
isposal Costs								_			-	 	l		t	
Subtotal												l		Ī		
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Revised August 2005 Demolition Horse Canyon Mine Lila Project C/007/013



Description	Materials	Means Reference Number	Cost	Length	Maga Maga	Height	Diameter Area	Volume	Weight	Density	e E	Number Unit	Factor	Quantity	5	Cost
ConveyorStoragePileStakingTube		io di la constanti di la const												+		
Structure's Demolition Cost	Steel Bld. Large	02220 110 0012	0.2 /CF			80	20	_			T	E		25	25133 CF	5027
Structure's Vol. Demolished														0.3	279 CY	
Rubble's Weight (exclude steel)																
Truck's Capacity																
Haulage																
Transportation Cost Non Steel Truck																
Transportation Cost Non Steel Drive																
Disposal Cost Non Steel				1												
ricers weight														1		
Haulade									\downarrow	1		+	<u> </u>	+	1	
Transportation Cost Steel Truck										1	1	1	T	1	Ţ	
Transportation Cost Steel Truck Drive				 -									I		I	
Disposal Cost Steel	ECDC	ECDC	35/TON							480		h/cf		-	67 ton	,
Subtotal	-		-		_	-	-	_	-	_		-	-	-] -	7372
Equipment 's Disposal Cost								+		1		+	<u> </u>	+	_	
Dismantling Cost											l				ļ	
Equipment 's Vol. Demolished													<u> </u>	<u> </u>		
Loading Costs									L		T	l	Ī			
Transport Costs							 -				Ì	ŀ				
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Demolition Horse Canyon Mine Lila Project C/007/013



Ħ		means Reference Number	Cost		Length	Wigth	Height Dia	Diameter Area	Volume	Weight	Density	Time	Number	Chit	Swell	Quantity	Chit	Cost
Steel	Steel Bld. Large	02220 110 0012	0.2 /CF	ħ.				$\ \cdot\ $	18	18850				ŗ		18850	<u>ل</u>	3770
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	Materials	Means Reference Number	Cost	Length	Ath Width	Height	Diameter	Area	Volume	Weight	Density	Time	Number	Unit Swell Factor	Quantity	Unit	Cost
	Steel Bld. Large	02220 110 0012	0.2 /CF		1		-		10000				5		100	10000 CF	2000
Structure's Vol. Demolished														Ц	0.3	111 CY	
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Disposal Cost Non Steel			1	1									\dagger	I	1		
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Transportation Cost Steel Truck Drive					-										L	-	
	ECDC	ECDC	35/TON	z	1				_		480		4	lb/cf		27 ton	945
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Equipment & Disposal Cost																	
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Demolition Cost	Concrete demolition	ConcreteDemo1	3.97 /CY						15						ľ	15 CY	
						-	ļ						-		1.3	20 CY	
	Front end loader 3 CY	02315 424 1300	1.39/CY			_										20CY	
	12 CY (16 Ton) Dump Truck 1/2 mi. 1	102315 490 0320	3.44 /CY		L								f	-		20 CY	
	On site disposal 02220 240 5550	02220 240 5550	7.6//CY		_							-		I		20 C.Y	
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Description	Materials	Means Reference Number	Cost	Length	CID IAA	negn	Diameter Area		volume	Weight Density	ty Time	Number	r Chirt	Swell	Quantity	Š	Cost
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cture's Demolition Cost	Guiderail remove	02220 240 0800	11.9LF	15	1520								ы		1520 FT	E	18088
Structure's Vol. Demolished																	
Rubbie's Weight (exclude steel)												_	_				
Truck's Capacity									_				_				
Haulage													ŀ				
Transportation Cost Non Steel Truck												L	L				
sportation Cost Non Steel Drive					_					_		L	_				
Disposal Cost Non Steel								-									
Steel's Weight																	
Truck's Capacity												ŀ	ŀ				
Haulage								-									
Transportation Cost Steel Truck																	
Transportation Cost Steel Truck Drive																	
osal Cost Steel											L		_				
Subtotal											-						18088
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Equipment 's Disposal Cost				_									L				
Dismantling Cost																	
Equipment 's Vol. Demolished							_		-	_							
Loading Costs																	
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Subtotal								-	-			-	l				
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Demolition Cost																ľ	
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Description	Materials	Reference Number	Cost	, ,		5	Diameter Area		PAA PILITON	weignt Density	Sing Sing		<u>.</u>	Factor	Coanant	į	isos
Chain Link Fence				L			-						L				
Structure's Demolition Cost	Chain link remove 8'-10'	02220 220 1700	2.92 /LF	1500	0				-			L	ᇤ		1500 FT	Ŀ	4380
Structure's Vol. Demolished									-								
Rubble's Weight (exclude steel)													-				
I ruck's Capacity													-				
Haulage																	
Transportation Cost Non Steel Truck			_						1	-							
Transportation Cost Non Steel Drive																	
Disposal Cost Non Steel													4				
Steel's Weight																	
Truck's Capacity										_							
Haulage												L					
Transportation Cost Steel Truck									L				L				
Transportation Cost Steel Truck Drive										_			L				
Disposal Cost Steel													-				
Subtotal													-				4380
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Equipment 's Disposal Cost										_			L				
Dismantling Cost									-	-							
Equipment 's Vol. Demolished										-	-	-	ŀ			Ī	
Loading Costs								L		ŀ			ļ			Ī	
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Describino	Materials	Means Reference Number	Cost	Š.	ingina	LI DIAA		Diameter Area	volume	weight	Density	Time		<u> </u>	Factor	Quantity	Cost	w
Mine Facilities Rd Truck Loadout Rd									-	ŀ							\dagger	
Structure's Demolition Cost							-					L		İ		l	-	
Structure's Vol. Demolished																	-	
Rubble's Weight (exclude steel)																-	ŀ	
Truck's Capacity										-	L	L					-	
Haulage							ŀ									_		l
Transportation Cost Non Steel Truck					1											-		
Transportation Cost Non Steel Drive													L			-		
Disposal Cost Non Steel										_								
iteel's Weight						-	_			-							l	
Truck's Capacity											-							
Haulage															l	-	-	
Transportation Cost Steel Truck							_										ł	
Transportation Cost Steel Truck Drive																	ł	
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Subtotal				-														
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Equipment's Disposal Cost																		
Dismanding Cost																		
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Loading Costs							-										l	
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Disposal Costs						l						-		Ī			1	
Subtotal							-									ł	ł	
Facilities Road				Ī	-		-								ļ		l	
sphalf Demolition																	ŀ	
Demolition Cost	Pavement Removal 4-6"	02220 250 5050	6.55 /SY	/SY	1750	24								λŚ		4667 SY	H	30569
Asphalt's Vol. Demolished							4.00			-				Z	13	674 CY	l	
Loading Cost															-	5	+	
Transportation Cost	[16.5 CY Dump Trailer 10 mi. md. trip 02315 490 1120	02315 490 1120	9.75	9.75/CY										l		l		
sposal Costs	ECDC	ECDC	35	TON			-		<u> </u>		-	-		CVITon	l	K74 CV		225
Subtotal					ľ				-	-								54159
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Equipment 's Disposal Cost										-				H			l	
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Materials Mate	sight Density Time Number Unit Swell Quantity Unit Cost Factor																		7.00-	13 144ACV	<u>!</u>		1 CY/Ton 1144 CY 40040					
Materials Means Unit Length Number Cost Unit Unit Length Pevement Removal 4.6" 02220 250 5050 6.65 /SY 6.65 /SY 6.65 /SY ECDC ECDC 35 /TON 35 /TON 35 /TON	Height Diameter Area																			3								
	Unit Cost																		6 44 /97			9.75	35					
	Materials	irking			ruck	rive			Drive													16.5 CY Dump Trailer 10 mi. md. trip 023	ECDC ECC					

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Describation	Water Jato	Reference Number	Cost	į	ā,			Clameter Area	Volume	weight	Density	e E	Number	Unit Swell Factor		Quantity	Cost
Mine Parking										_				ſ	-		-
Structure's Demolition Cost																	
Structure's Vol. Demolished															-		
Rubble's Weight (exclude steel)										_							
Truck's Capacity										_	L				_		
Haulage										L	L				-		
Transportation Cost Non Steel Truck																	-
Transportation Cost Non Steel Drive										L	L				-		
Disposal Cost Non Steel															-		
el's Weight									_			L					
Truck's Capacity								-		-				Ī	-		
Haulage																	
Transportation Cost Steel Truck												L					
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posal Cost Steel			L			-			_	-				l			
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Revised August 2005 Demolition Horse Canyon Mine Lila Project C/007/013

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Revised August 2005

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D9R Semi-U EROPS (9-54) (2H04)	17115	72.3	0.1	52	238.5	-	238.5 S/HR	VHR					73.6 HR	¥	175
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Subtotal						H									30446
Upper Road Area															
769D (20-11) (1Q04)	10520	40.4	0.1	42	152.19	-	152.19 \$/HR	FE	5000CY	<u>}</u>	289	289 CY/HR	17.3 HR	œ.	2633
988G EROPS (9-38) (3Q03)	9010	40.05	0.1	52	152.37	4	609.48	HR					17.3 HR	¥	10544
CAT 325BL (10-21)(2nd04)	9170	35,55	0.1	52	148.42	-	148.42 \$/HR	J.					17.3 HR	¥	13177
00 00 11 11 11 11 11 11 11 11 11 11 11 1	377727	100		1											
Dar Semi-U EROPS (9-54) (ZH04)	1/115	(2.3	0.1	52	238.5	7	238.5 \$/HR	HR	2000		120	120 CY/HR	41.7 HR	ç	66
					-										86
Subtotal							-								19890
Total															1

Page 3 of 4

		Hourly		Operator's	-		Total						Equip. +		
	Cost	Costs Overhead Wage Rate	Overhead	Wage Rate	Cost	or Eq.	Costs	Units	Quantity	Sprits	Production	C	Time/Dis.	Chits	Cost
Horse Canyon Mine Lila Canyon Project															
Grading															
Load and Haul Topsoil															
631G (9-51) (2nd04)	19145	19145	0.1	25	267.14	3	801.42 \$/HR	S/HR	56000 CY	ς	393	393 CY/HR	142.5 HR	~	11420
D9R Semi-U EROPS (9-54) (2H04)	17115	72.3	0.1	52	238.5	-	238.5 \$/HR	\$/HR					142.5 HR		33986
Subtotal															148188
769D (20-11) (1Q04)	10520		0.1	42	152.19	1	152.19 \$/HR	SHR	10000	չ	289	289 CY/HR	34.6 HR	~	5266
988G EROPS (9-38) (3Q03)	9010	40.05	0.1	25	152.37	4	609.48 \$/HR	\$/HR					34.6 HR	_	21088
CAT 325BL (10-21)(2nd04)	9170	35.55	0.1	25	148.42	-	148.42 \$/HR	\$/HR					34.6 HR	~	5135
Subtotal															31489
															62978
Total					-										211166
							-					-			

		Hourly		Operator's		Number	Total						Equip. +		
	Equipment	Equipment Operating Equipment Hourly	Equipment	Hourly	Hourly	of Men Eq. & Lab.	Eq. & Lab.				Production		Labor		
	Cost	Costs	Overhead	Wage Rate	Cost	or Eq.	Costs	Chits	Quantity	Chits		Chits	Time/Dis.	Chits	Cost
Horse Canyon Mine Lila Canyon Project Grading									-						
Support															
5,000 gal H2O truck Diesel (20-17) (1004)	4725	28.05	0.1	42	102.39	1	102.39	\$/HR					384.2 HR	£	3933
Pickup Truck Crew 4x4 1 ton (20-17) (2N04)	820	7.8	0.1	٥	13.71	-	13.71	\$/HR					384.2 HR	壬	526
Foreman Average, Outside					57.3	1	57.3	\$/HR					384.2 HR	¥	2201
															9999
Total					-							T	Ī		66620

Preparation Profession Profession Profession Profession Profession Profession Preparation	<u> </u>	Description	Materials	Means Reference Number	ost C C	<u></u>	Length	Width	Height Dian	Diameter Area	a Volume		Weight Density	sity Time	Number Number	iber Unit	it Swell Factor	Il Quantity or	y Unit	Cost
Properties Pro	Ş	Vegetation										-			-	l	l	+	+	ļ
Figure 1 Femiliar Femiliar Hydro Spreader (equip. & labor) B-81 80MR Revergiboz. 19.13 MSF	ŝ	und Preparation					-					ŀ	-	Ì		+	l			
Problem The Dozerwiscentifiers Michael State The Dozerwiscentifiers Michael State The Dozerwiscentifiers Michael State The Dozerwiscentifiers Michael State The Dozerwiscentifiers The Dozerwiscentifie	Š	See Chapter 5 page 95-96 Sec. 553,230				T	l					-			-		ļ	1	<u> </u>	
Pocking Exceverion Bulk Bank 2 CY (32281) M023154240260 17 CY CY	Soil		75 HP Dozerw/scarifiers		3.87	MSF					34			ŀ		AC			481 MSF	_
Material Fertilizer Hydrot Spread Mat. Cnty RevegOto 1.7 CV Mo2154240260 1.7 CV Material Fertilizer Hydrot Spread Mat. Cnty RevegOto 8.7 MuSF MSF	ő					T	ŀ				-	ŀ		+	-	1	l	<u> </u>		1
Material Ferritzer Hydro Spreader (equip. & labor) B-31 80MS Feveg006	Ass	340 CY/AC	Excavation Bulk Bank 2 CY (322BL)	M023154240260	1.7	Ş	T		L		8	-			-	AC	L	F	560 CY	ľ
Fettizer Hydor Spread Mat. Only Reveg006 8.71 MSF See Application Hydror Spread Mat. Only Reveg006 8.71 MSF See Application Hydror Spreader (equip, & labor) B-81 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-81 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-81 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-81 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-81 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-81 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labor) B-91 80M Reveg002 19.13 MSF See Application Hydror Spreader (equip, & labo	3	ototal																		22
Material Fertilizer Hytofo Spread Mat. Only Revegible 8.11 MiSF Materials Fertilizer Hytofo Spread Mat. Only Revegible 8.11 MiSF Materials Fertilizer Hytofo Spreaded (ciquip, & labor) B-81 80MS Revegible 8.11 MiSF Materials Fertilizer Hytofo Spreader (ciquip, & labor) B-81 80MS Revegible 8.11 MiSF Materials Fertilizer Hytofo Spreader (ciquip, & labor) B-81 80MS Revegible 8.11 MiSF Miderials Fertilizer Hytofo Spreader (ciquip, & labor) B-81 80MS Revegible 8.11 MiSF Miderials Fertilizer Hytofo Spreader (ciquip, & labor) B-81 80MS Revegible 8.11 MiSF MisF Mi	Š	ding				T	1	\dagger		1		\dagger	+	+		Ť	+	+		
Application Hydro Spreader (equip, & labor) B-81 80MS Reveg002 19.13 MSF	Fert		Fertilizer Hyrdor Spread Mat. Only	Reveg006	8.71	MSF			-		34	ŀ	l			¥	T		481 MSF	٦
Materials Greeke for Lia Carryon Lia07131 1405/MC 34 1405	Fert		Hydro Spreader (equip. & labor) B-81 80M	SReveg002	19,13	MSF				-	34					Ą	<u> </u>		481 MSF	7
Materials Forte for Lila Carryon Lila07132 1923/IAC 34 C	See		Grasses for Lila Canyon	Lila07131	140.5	ΑC					34			l		8	<u> </u>	-	34 AC	
Application Comparison State Comparison Compariso	See		Forbs for Lila Canyon	Lila07132	92.2	AC				-	34	L				ş			34 AC	<u>"</u>
Application Hydro Spreader (equip, & labor) 18.13 M/SF 3.4 AC 14.61 M/SF	Še		Shrubs for Lila Canyon	Lila07133	106.45	PC PC					34		L		-	¥	L		34 AC	
List of Institution Hay 1" materials only Q291050002560 Reveg001 68/MSF AC 1443 IMSF Population Hydro Spreader (equip. & labor) B-81 6MG/Reveg002 19.13/MSF 34 AC 1443 IMSF Reveg001 18.13/MSF 34 AC 1443 IMSF Reveg002 18.13/MSF AC 1441 IMSF Ing B B B B B SOW, reseding rate B B B B B B	See		Hydro Spreader (equip. & labor) B-81 80M	SReveg002	19.13	MSF					34			L		Ą	L	_	481 MSF	2
Op/lication Hydro Spreader (equip. & labor) B-81 80MS/Reveg002 19.13/MSF AC 1461/MSF Total mining Total mining Total mining Total mining Total mining Total mining SOW, reseeding rate Sow inseeding rate Total mining Total mining Total mining Total mining	ğ		Hay 1" material only 029105000250	Reveg001	189	MSF			L	ŀ	34	_			_	¥	L	_	481 MSF	ě
50% resecting rate	₹	plication	Hydro Spreader (equip. & labor) B-81 80M	S Reveg002	19.13	MSF		_		<u> </u>	34	H				Ş			481 MSF	28
DOS, reseeding rate Contract of the contract of	g	otal															2.7	. S. S.		210
50% reseding rate							1													
50% reseding rate	ž	eding									_	_			_		_	_		105
	Assu	me 50% reseeding rate								H										
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	Total		A STATE OF THE STA	Section of the second		_										L	L	L	-	340

Revised April 2008 Revegetation Costs Horse Canyon Mine Lila Project C/007/013